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VOL. CLXXXVIII. No. 3467.] WEDNESDAY, OCTOBER 30, 1929 [81ST YEAR.

Editorial Notes.

The Institution Autumn Meeting.

Discussing the Research Work.

THE arrangements which are being made for the Autumn Meeting of the Institution of Gas Engineers give promise of a most interesting programme. Not only will the Reports presented at the Annual Meeting be discussed at much greater length than was then possible, but Supplementary and Progress Reports are being prepared. A definite scheme of organization of the discussions is being planned to ensure that the maximum amount of information may be given to the members. An indication of the arrangements was given in the "JOURNAL" for Oct. 16, p. 163.

The statement on "The Use of Creosote in Carburetted Water Gas Plants" will provide a review of the entire subject, and an examination of the future possibilities of extended use. Proposals of experimental work to be done immediately, to obtain the fundamental data, are referred to in the memorandum.

The contributions from the Ammonia Sub-Committee will provide something in the nature of the proceedings at an Annual Meeting; for the First and Second Reports will comprise five papers: Mr. H. Hollings and Dr. S. Pexton, on "Economics in the Recovery of Ammonia by the Indirect Process;" Dr. A. Parker, on "Direct and Semi-Direct Ammonia Recovery Applied in Gas-Works;" Dr. E. W. Smith, on "Liquid Purification of Coal Gas by Means of Ammonia;" Prof. J. W. Cobb, on "The Zinc Process for Recovery of Ammonia and Sulphur from Gas;" and Mr. Philip G. G. Moon, on "The Burkheiser Process." A further Report from the Effluents Sub-Committee will take the form of contributions by Dr. A. Parker, on "The Reduction of the Amount of Phenol in Ammoniacal and Effluent Liquors;" jointly by Dr. A. Parker and Dr. A. Monkhouse, on "Phenol Recovery;" and by Dr. A. Monkhouse, on "A Visit to Germany to Inspect Phenol Recovery Plants."

It will be recalled that at the Annual Meetings of the Institution there has of late years been but little time to devote to the Reports of the various Committees and the research work generally; and this was, perhaps, particularly the case last June, when the programme was certainly too full to allow of adequate discussion. Arrangements have consequently been made for this Special Meeting which it is most desirable that all interested in the scientific work of the gas industry and its technical advancement should, if possible, attend. It will be realized that matters of the utmost importance are to be considered.

The Charter Dinner which, as already announced in these pages, is to take place at the Criterion Restaurant on Wednesday, Nov. 13, promises to be a great success. Many men prominent in national life, as well as the leading men in the gas industry, have already intimated their intention of being present at this historic function. Members are reminded that requests for tickets must be made not later than Nov. 6, in order that adequate accommodation may be provided.

The Magic Word.

THE keynote of the Presidential Address with which Mr. Frank H. Jones, M.Inst.C.E., opened the business session of the British Commercial Gas Association at Eastbourne yesterday morning was the magic word "Service"—the "Open Sesame" to all the rewards which are to be reaped by our great industry. Never at any time could there have been a better text than is provided by this single word; never will there be a better one. Service, within and without, brings to us both the satisfied employee and the satisfied consumer; and with these secured, the rest follows. Naturally, the President in his address concerned himself largely with the consumer; and here service, though it may sound very simple, is a complicated matter. It is made up of many things, each one of which is indispensable, if the best results are to be secured. With the progress that has been made in other directions, the implication of the term "Service" has been continually broadened. It is far more than individual, because, as the President pointed out, a satisfied or a dissatisfied consumer in any particular spot influences, for good or ill, as the case may be, the gas undertakings throughout the land. No undertaking stands alone; each is a part of one great industry, and so owes a duty to the industry as well as to itself. This is why an undertaking which does not fall into line with regard to the question of service cannot be permitted to go on in its own sweet way.

There is no need why any undertaking should not fall into line; for, as the President said, there is the British Commercial Gas Association, whose object is to promote the commercial prosperity of the gas industry by co-operative action, and this includes not only all branches of propaganda and publicity work among the public, but educative work throughout the industry for the increased efficiency of gas service everywhere. The completeness with which the Association carry out their work is well known throughout the industry, and is further exemplified by the comprehensive nature of the programme prepared for this week's conference at Eastbourne. Cheap gas can only be attained as the result of efficient service, of which, in its turn, it forms a part. The President drew attention to the fact that in the case of the two Companies who have combined to do the honours of the conference—that is to say, the Wandsworth, Wimbledon, and Epsom District Gas Company and the Eastbourne Gas Company—they have for many years sold gas very cheaply, and the idea of "Service" is always in the forefront of their prospective programmes and daily routine.

Efficient service can be given only by suitable and fully qualified men, which means that there must be opportunities for acquiring the necessary training, and that salaries which will attract the right type of men must be offered. This is an aspect of the subject which was emphasized by Mr. Frank Jones. If any practical result follows upon his remarks, and if he had accomplished nothing else for the Association, by that one fact alone he would far more than justify his Presidency. That the Association have gained in other ways under his guidance, we are well aware.

An Attempt to See Things Whole.

The gas industry must feel grateful to Sir David Milne-Watson for placing before a large and influential body of technologists interested in fuel production and utilization in its widest sense a dispassionate survey of a few of the major problems which beset the Area Gas Supply Committee which is at present considering the question of the co-ordination of gas and coking interests in a large area in the Industrial North. This survey constituted one section of his Presidential Address to the Institute of Fuel on Thursday last; and we desire to emphasize here certain of his observations on this subject, and also on the questions of electricity supply and the undoubted need for clean coal for the carbonizing industries.

The first problem would not be nearly so complicated if the aim of the gas industry was not to supply its consumers with gas at the cheapest price—in other words, to safeguard their interests. And the charge for gas depends more than anything else on the price which can be realized for coke; a glut of the latter commodity must imply a dearer gaseous therm. Complete gasification enthusiasts will regard this as a suitable topic for conversation, but they have yet to prove that the gaseous therm is cheaper when produced by this system. Essentially the coking industry is a coal-treatment industry; it is unhampered by legislative restrictions and has no statutory obligations. Coal gas and coke-oven gas for town supply cannot under present conditions be considered in the same terms. The collieries stand to gain by the replacement of a goodly portion of their sale of raw coal by its carbonization; but the disadvantages that may ensue to gas consumers in the future, should control of gas manufacturing costs pass to colliery owners, must, as is pointed out by Sir David, receive grave thought.

The attitude of the gas industry on the foregoing problem, as on that of electricity supply, is that expressed by Sir David as being the desirable aim of the Institute of Fuel: "We must not allow progress which benefits "the whole community to be unduly hindered by sympathy "with a small minority." The fact that this attitude has yet to receive universal recognition must not, however, prevent our industry from expressing its conclusions after a genuine attempt to "see things whole." Before many years have elapsed, for example, those who see the millennium in the transference of all electricity generation to national super-stations will discover that theoretical ideals do not always raise the burdens of either the industrialist or the housewife. No one could think otherwise than that industries must have cheap power, but this righteous conviction must not overshadow the fact that cheap heat is still more important, and that co-ordination in bringing this about is one of the nation's primary needs. There must be many who share Sir David's view that much delay to industrial and general progress is bound to result from excessive attention to one phase—the development of electricity—of a complex problem, and the corresponding neglect of the benefits available from an organization of the carbonizing industries, and from ordered attention to the heat and power requirements and production methods of individual industries. Even the gas industry, strange as it may appear, knows a little about electricity generation. The Gas Light and Coke Company, as an instance, produce 14 million units per annum for use in the manufacture of gas. In the most recent installations employing surplus heat, the unit can be produced at 0·15d., excluding capital costs.

Finally, we wish to call attention to Sir David's remarks on a matter which concerns the future prosperity of all carbonizing industries—clean coal. It is not the first time he has emphasized the importance of clean coal; nor, indeed, do we break virgin ground in writing about it to-day. However, had we referred to the matter a hundred times, we should do so again without a tinge of shame. Sir David observed recently—see "Journal" for July 17, p. 127—that coal containing 4 p.ct. of ash would mean a saving to the gas industry of one to one-and-a-half millions sterling annually. His statement last Thursday that cleaning processes are now applied to over 25 p.ct. of the total of all British coal mined gives rise to satisfaction, but until it becomes general for gas undertakings to be supplied with clean coal, this satisfaction must remain partial. It has been suggested that large gas undertakings might well clean the coal after delivery, but, as is pointed out by Sir David, apart from the loss due to the transport cost of removable foreign matter to their premises, they are faced with the difficulty of the disposal of dross, which does not present itself so acutely at the pithead. Clean coal is necessarily dearer than dirty coal; but the enlightened gas manager should be willing to pay a reasonable extra cost in view of the responsibility which he has in regard not only to the maintenance costs of carbonizing plant, but to the future of coke sales, particularly in the domestic market, the success of which, as time passes, will depend more and more upon low ash content. This point is amplified in a later editorial note to-day.

Utilization of Surplus Coke Oven Gas.

The subject of the utilization of surplus coke oven gas was dealt with further at the meeting of the Institute of Fuel in a lengthy paper by Mr. E. C. Evans, who thinks that, for coke oven gas to take the place of raw coal in a large number of metallurgical operations, the price must be of the order of 1½d. per therm. For the generation of power, it is worth 0·7d. per therm; and for steam raising, ½d. per therm. Depending on local conditions, says Mr. Evans, the price which the iron and steel industry can afford to pay for coke oven gas, purified, delivered, and purchased in large quantities, is between 1·2d. and 2d. per therm, based on existing costs for equivalent service. Taking distribution costs into account, the value of the gas at the ovens will, as a minimum, be about 1d. per therm. The author suggests that, "if the gas industry "were given greater powers, which would enable in-"dividual undertakings to co-operate and to develop a "rationalized method of distribution, so as to secure the "maximum of equalization between production and de-"mand over the widest practicable area, the coke oven "gas available could be utilized to the greatest advan-"tage."

At the same time, it is shown clearly in the paper that the iron and steel industry offers a very big field for surplus coke oven gas utilization. This fact was emphasized strongly by Sir Arthur Duckham during the course of the discussion. Coke ovens, he stated, should be the adjunct of iron and steel works; and granting such situation, gas has no real relationship in the balance-sheet of the coke oven plant. All too often the price of the gas is allowed to assume disproportionate dimensions and to overshadow the most important problem which the iron and steel industry has to solve—how to obtain a uniform supply of good coke at reasonable price. In any case, the price at which surplus coke oven gas could be sold is determined by local conditions; there is no absolute price for it. Mr. Evans said he was in complete agreement that the future of the iron and steel industry depends on a uniform supply of coke, and he instanced a works in the Midlands which is using between twenty and thirty different cokes every month, varying by as much as 8 p.ct. in ash content. There is plenty of room, he asserted, for a reduction in pig-iron costs of 3s. per ton by this means alone. Moreover, the savings could be translated throughout all operations to the finished product, resulting in a saving of about 10s. per ton in the finished steel. Rationalization and large-scale production constitute the best—indeed, the essential—line of attack.

The point we wish to emphasize is that utilization of surplus coke oven gas is a problem of many facets, and that sale to gas undertakings is only one of them. It is unfortunate that national modesty prevents the public from appreciating that England is not lagging behind other countries—Germany and America, of course, being foremost in the mind—in distributing coke oven gas for domestic and industrial purposes, taking all circumstances into consideration. It is unfortunate also, as we have said before in these columns, that the gas industry of this country is apt to be regarded, albeit without foundation, as a stumbling-block to the endeavours of the coke oven industry to remedy a position which is not at present enviable, but which, we are certain, is far from being as

hopeless as many would have it appear. The hasty suggest that there might be two sets of distributors of gas, should it be found that the gas industry does not take kindly and quickly to every proposition made by the colliery owners. The outcome of this would be chaos. The hasty also speak glibly of Government intervention. We are all for the Government helping in research or in co-ordination of information; we hold no brief whatever for Government intervention.

The paper by Mr. Evans is published practically *in extenso* in the "JOURNAL" to-day, and, in view of the importance of the question, we have devoted a good deal of space to the discussion. In this Sir Alexander Walker suggested that coke oven gas might be supplied to industrialists at very low cost if consumers' demands were satisfied at off-peak periods, and the consumers installed small gasholders on their own sites. Such a plan would entail no interference with the gas supply to ordinary domestic consumers. He regards it as the gas industry's duty to take coke oven gas where it is proved beneficial to the basic industries of the country—to which we would add the rider, where it is also proved beneficial to the industry's consumers.

Gas Appliance Construction.

MR. F. S. LARKIN, Manager of the Fulham Stove Works of the Gas Light and Coke Company, is a man of very wide practical experience; and in his Presidential Address before the London and Southern District Junior Gas Association on Friday last, which will be found in later columns of our issue to-day, he considered several phases of a subject—gas appliance construction—seldom treated with such authority in addresses by Juniors to Juniors.

The magnitude of the gas appliance renovation work carried out at Fulham will not surprise those of our readers who have attempted the task—no easy one—of visualizing the area and the population supplied with gas service by the Gas Light and Coke Company; nor will it surprise those who are acquainted with the policy of the Company to learn that in the last seven years they have scrapped appliances to the value of nearly three-quarters of a million pounds sterling, and that extension of the scrapping scheme will before long bring this figure to the million mark. Organizing this work is not a light task, and has necessitated the inauguration of a central meter works at Willesden, so that at Fulham and Haggerston there could be concentration on apparatus. The opening ceremony of the Willesden Works, which was performed by the Rt. Hon. William Graham, M.P., President of the Board of Trade, took place on Tuesday of last week, and is the subject of an illustrated article in the "JOURNAL" to-day.

There can be no two opinions on Mr. Larkin's statement that efficient apparatus constitutes one of the finest advertisements the gas industry can have, and that hire is a good method of ensuring that competitors will not find it easy to make inroads into the industry's load. An inefficient, out-of-date appliance gives opportunity for a comparison favourable to the competitor's new piece of apparatus; and the consumer, being satisfied with the result of the change from an obsolete gas appliance to the best which competition can offer, becomes a living advertisement for the competitor. The scrapping of bad apparatus entails courage and expense, but it is essential to the progress of gas. A hire system, which usually incorporates maintenance, gives an undertaking invaluable information on the condition of the appliances in consumers' houses, and faulty apparatus can be brought into the shops to be reconditioned or discarded. Up to the present, reconditioning has not been a very difficult matter, but the advent of enamel has added an obstacle which must be faced and overcome, for future consumers will not be satisfied without enamel. The difficulty is, first, that an enamelled surface which has become discoloured will not be accepted by a consumer who has seen the perfect article exhibited in the showroom or installed in a friend's house; and, secondly, that we have not yet a perfect enamel, though great credit must be given to the makers for what they have already achieved. In this regard, Mr. Larkin's remarks on mottle and self-colour enamels are most interesting.

We are in complete agreement with Mr. Larkin that the aim of the gas cooker manufacturers should be to incorporate in the hotplate one or two very powerful burners for quick boiling operations. A small sacrifice of efficiency is beside the point when the importance of the time factor is appreciated. Apart from the matter of cost, the greatest advantage which the gas cooker possesses over the electric cooker is that it is a more practical proposition—that cooking operations on the gas hotplate can be performed with greater speed. As to the controversy of one-burner *versus* two-burner ovens, Mr. Larkin suggests that this is a vital question only to the advocates of each method; and he is not the only one who holds this view.

Belief in a bright future for the modern coke fire is expressed by Mr. Larkin, and he advocates the hire of efficient grates for burning coke, complete with gas ignition. The latter has, of course, lent a fresh complexion to the sale of gas coke for the open domestic fire; and in this connection we would call the attention of our readers to the tests on the ignitibility of various cokes undertaken by the Fuel Research Board, to which investigation reference is made in later columns. Gas ignition has largely reduced the significance of the ignition-point of gas coke in relation to fuels produced by low-temperature carbonization; and the main and immediate concern of gas undertakings should be to produce a coke of low ash content. Once again, entirely apart from the matter of cost, gas coke of low ash content can well hold its own against any low-temperature fuel of relatively high ash content. Eventually the success of coke sales for domestic purposes will depend on the ash which is contained in the coke supplied.

Finally, we must say that Mr. Larkin's account of what is being done at the Fulham Works to train boys to be efficient fitters is excellent reading. From the very start of their employment "trainees" are given practical encouragement and assistance. They are made to feel that their work will be rewarded, and that they are not merely existing in a blind alley. The scheme at Fulham, which gives every lad a chance to prove his worth, and which arouses a spirit of enthusiasm, is admirable; through it the Company is giving a helping hand to all who show their willingness to help themselves.

Gas Industries Section of the "B.I.F."

Excellent progress was announced at a meeting of the Gas Industries Section on Oct. 17. The space already sold, we learn, is greater in area than was the whole of the Section for the 1929 Fair. A few stands still remain unallotted, and applications for these should be sent immediately. Already the number of firms who have taken space for 1930 is in excess of the total firms exhibiting in the Section at the last Fair. The open type of stand which has been so successful for the past two years will again be adopted, and the Fair Management Committee are now recommending the open type of stand with facia at the back for other sections of the Fair. All firms showing in the Section have agreed to employ the uniform colour scheme. A different method of distributing tickets is being adopted for the 1930 Fair. Exhibitors will be able to obtain blocks of tickets from the Fair Authorities for distribution to likely buyers, and in addition tickets will be forwarded by the Gas Industries Section Committee to every gas undertaking in the country.

New Conference Hall.

A meeting of the Joint Gas Conference Committee has taken place, and preliminary arrangements are already in train. It is proposed that the Conference shall take place on Tuesday, Wednesday, and Thursday (Feb. 18, 19, and 20) of the first week of the Fair. A new conference hall and dining room is being built, and will be situated on the northern side of the building. This will be reached by an 80 ft. wide entrance lounge which will lead from the existing buildings adjacent to the Gas Industries Section. It will be remembered that the

Conference Hall last February was on the south side of the building, and the noise of the trains passing and shunting operations caused annoyance during the various meetings. It is hoped that in the building now being erected these troubles will be avoided. Firms who are desirous of taking a portion of the small amount of space which still remains unallotted should lose no time in communicating with the Hon. Secretary of the Gas Industries Section (Mr. R. J. Rogers) at the Gas Department, Council House, Birmingham, who will give them particulars as to the position and area of those stands which have not yet been taken up.

A Wonderful Contribution.

This week Eastbourne is much in the minds of members of the gas industry, and the gas industry is much in the minds of the inhabitants of Eastbourne. Matters have been discussed which are of vital importance to the welfare both of the community and of the industry, for they bear upon gas service. What gas does and can do, it is impossible to reiterate too often; for people require a lot of teaching, and sometimes what they regard as knowledge is none too sound. It was shown by Mr. F. W. Goodenough a few days ago, in an address which he prepared for presentation at the North-East Coast Exhibition (an abstract of which appears on another page), that the gas industry needs the co-operation of the public, and that the public need the co-operation of the gas industry. To what extent do the community realize the enormous benefit of an efficient gas supply? This benefit is not a promise of the future—not a matter which is "in the air," so to speak—but a thing which is already enjoyed to a very great extent. But by a large section of the public it is enjoyed in ignorance of its source. Let us quote from Mr. Goodenough's address the kind of fact which should be in everyone's mind: "As proof of how gas is helping to abate the smoke pollution of the atmosphere, it may be stated that the new gas appliances fitted in the Newcastle district alone during the last two years have made 32,000 chimneys smoke-free and soot-free. In London the soot-fall in 1912 was 76,000 tons. In 1925, though the population had considerably increased, this figure was halved, because, during that period, the number of gas and gas coke burning appliances had been more than doubled. It is a modest estimate that the belching forth of smoke has been abolished from at least two chimneys on an average in each of the nine million homes using gas in this country. From this can be realized the big contribution to the practical solution of the smoke evil that the gas industry has made."

Future Outlook of the Gas Industry.

Opening new meter works of the Gas Light and Coke Company in Willesden last week, the Rt. Hon. William Graham, M.P., President of the Board of Trade, emphasized that those responsible for the welfare of any great public utility undertaking should guard against pessimism. On the contrary they had, he said, everything to gain by being soundly optimistic; and he trusted that the Gas Light and Coke Company would look forward not merely to a further hundred years of necessary service to the community, but to several hundreds of years.

The "Gas Salesman" Supplement.

A further address by Mr. H. Ernest Hunt will be found in the "Gas Salesman" Supplement appearing with this issue. There is also an abstract of a helpful address by Mr. F. W. Goodenough. Handsome new showrooms at Fleet have been opened by the Aldershot Company; and these are illustrated. There are also other photographs which will prove interesting to readers.

Rationalization.

This is a word which is bandied-about without, in general, any clear interpretation of its meaning. Admittedly it is difficult to give a simple, and at the same time comprehensive, definition of rationalization, but it may be described as the technical, commercial, and financial organization of an industry in such a manner that the cost of manufacture of the products of the industry can be reduced to the lowest possible level without adversely affecting the conditions of employment of those in the industry. To put it in other words, it is the employment of all methods of technique and organization in order to increase the productivity of the workers to the highest possible degree, and as a result to improve, increase, and cheapen production. These definitions are given by Mr. J. Davidson Pratt, O.B.E., M.A., B.Sc., in a paper on the subject which he read before the Chemical Engineering Group of the Society of Chemical Industry on Oct. 11, an extract from which we publish in later columns of our issue to-day. There are, of course, two ways of effecting rationalization—amalgamation and association; and as both these methods are being put into practice by the gas industry, which is slowly but surely becoming rationalized, Mr. Pratt's remarks will be of great interest to our readers.

Deposits for Gas Supply.

We are interested in what Mr. E. P. Prezzano, Vice-President of the Westchester Lighting Company, thinks about deposits for gas supply. Some years ago, he explained at the Convention of the American Gas Association, the Company decided not to require a deposit where a customer could give satisfactory credit references. They also refunded deposits already on their books as soon as the customer's credit was established. "With a marked decrease in the number of deposits on hand, and an increase in sales from $9,000,000 to over $15,000,000 during the past few years," stated Mr. Prezzano, "our loss from uncollectible bills has decreased from 0·75 p.ct. to less than 0·3 p.ct."

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Nov. 2.—Midland Junior Gas Association.—Visit to Saltley Works, Birmingham.

Nov. 6.—Southern Association of Gas Engineers and Managers (Eastern District).—Meeting at No. 28, Grosvenor Gardens, S.W. 1, 2.30 p.m.

Nov. 6.—London and Southern District Junior Gas Association.—Visit to the Works of the Stanton Ironworks Company, near Nottingham.

Nov. 7.—Midland Association of Gas Engineers and Managers.—Autumn meeting in Birmingham.

Nov. 7.—Gas Companies' Protection Association.—Annual meeting, Caxton Hall, Westminster, 2.30 p.m.

Nov. 9.—Scottish Junior Gas Association (Eastern District).—Joint Meeting with Western District in Glasgow.

Nov. 13-14.—Institution of Gas Engineers.—General meeting in London.

Nov. 14.—Midland Junior Gas Association.—Meeting in Birmingham. Discussion on the "Relative Advantages of Iron and Lead for Internal Carcassing."

Nov. 16.—Scottish Junior Gas Association (Eastern District).—Joint visit with Western District to Granton Works.

Nov. 18-23.—Public Works, Roads, and Transport Congress and Exhibition.—Royal Agricultural Hall, Islington.

Nov. 20.—Society of British Gas Industries.—Meeting of Council in the morning.

Nov. 20.—Society of British Gas Industries.—Autumn General Meeting, Hotel Metropole.

Nov. 22.—Southern Association of Gas Engineers and Managers.—General meeting at the Hotel Cecil, Strand, W.C., 2.15 p.m.

Nov. 28.—Midland Junior Gas Association.—Visit to Biscuit Factory of Messrs. Alfred Hughes & Sons, Ltd., Birmingham.

Evening Star Lodge, No. 1719.

The regular meeting of the Evening Star Lodge, No. 1719, was held at the Freemasons' Hall, Great Queen Street, London, on Wednesday last, the Worshipful Master, W.Bro. James W. Foreman, in the Chair.

Following the opening proceedings, a ballot was taken for, as a joining member, Bro. William Hawkyard, of the Kershaw Lodge, No. 3839, Works Superintendent to the Tottenham Gas Company, who was unanimously elected.

Bro. Charles William Milward Rogers, who was initiated at the Emergency Meeting on June 6, was passed to the Second Degree by the Worshipful Master.

At the dinner which subsequently took place at the Connaught Rooms, W.Bro. Charles Clare proposed the toast of "The Visitors," which was responded to by Bro. E. W. Smith, of the Murdoch Lodge; Bro. B. P. Bezant, of the Lullingstone Lodge; and Bro. H. Rehn, of the Acacia Lodge.

The toasts were interspersed by an excellent programme of music; W.Bro. Herbert Townsend being at the piano.

PERSONAL.

The many friends of Mr. Thomas Curr will join with us in expressing our deep regret that his state of health is such that he has been placed upon the retired list by the Board of the South Metropolitan Gas Company. Mr. Curr was granted leave of absence six months ago, and it was hoped that this prolonged rest would have enabled him to take up his duties again at the commencement of the present winter season. This has unhappily proved not to be the case, and, guided by the medical reports placed before them, the Board felt no other course was possible than permanently to release Mr. Curr from the responsibilities of his office. His retirement will be regretted by all who worked with him, but he will chiefly be remembered by his confrères in the industry for the part he played in adapting female labour to the requirements of gas-works, including the operating of retort house machinery, during a critical period of the war, and for which he was awarded the rank of O.B.E. The loss to the Company of the services of their two leading engineering officials within a few weeks of each other, and on the eve of the busy period of gas manufacture, must inevitably be productive of anxiety to those responsible for the management.

The Minister of Health, the Rt. Hon. Arthur Greenwood, M.P., has appointed Mr. W. A. Damon, B.Sc., F.I.C., as Chief Inspector of Alkali, &c., Works, in succession to Dr. T. L. Bailey, Ph.D., F.I.C., who is retiring from the Public Service on Nov. 12 next, on attaining the age limit.

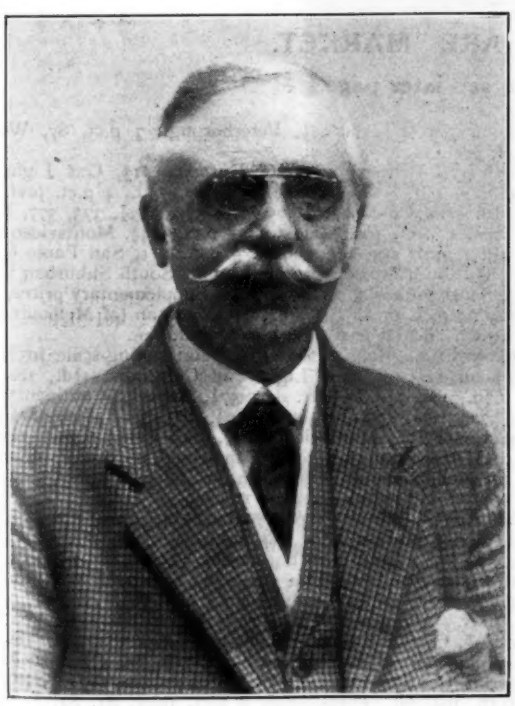
Mr. R. W. Edwards, Chairman and Managing Director of the Aldershot Gas, Water, and District Lighting Company, who is the Mayor-Elect of Aldershot for the coming year, will be returned to the Council unopposed.

Dr. E. F. Armstrong, a Director of the South Metropolitan Gas Company, has joined the Board of Sensible Heat Distillation, Ltd.

OBITUARY.

JOHN WALTER MORRISON.

We regret to have to record the death, on Oct. 15, of Mr. John Walter Morrison, formerly Chief Engineer to the Sheffield Gas Company. He was born in 1861 at Sale, Cheshire, and was educated at King Edward VI. Grammar School, Birmingham. He commenced his engineering training in 1877 with a London firm of Engineers, and was articled to the late Mr. Henry Hack, one time Chief Engineer to the City of Birmingham Gas Department. Mr. Morrison was appointed Superintendent of the Saltley Gas-Works in 1888, which position he filled until 1899, when he was appointed Chief Engineer to the Sheffield Gas Company. He occupied this post till June, 1918, when, owing to a breakdown in health and the continual strain during the war, he resigned. When Mr. Morrison left Birmingham, he was the recipient of a gold watch, subscribed for by the staff and employees of the Saltley and Swan Village Gas-



works, as a token of their esteem—on which occasion Mr. Hack spoke in high terms of the great assistance he had received from Mr. Morrison.

During his term of office at Sheffield, the works were practically remodelled. The gas made in 1899 was 2680 million c.ft., and the average selling price was 1s. 9d. per 1000 c.ft.; in 1917 the gas made amounted to 6920 millions, and the average price was 1s. 1¾d.

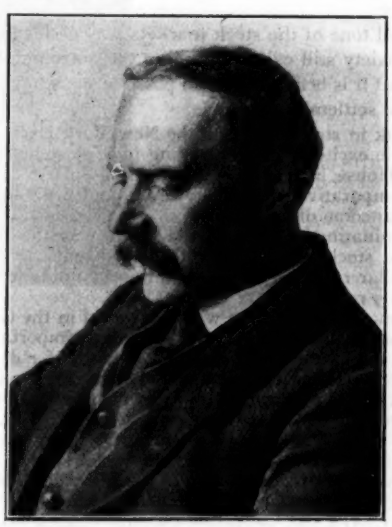
Deceased was a Member of the Institution of Gas Engineers, being elected to a seat on the Council in 1909, when he was President of the Manchester and District Institution of Gas Engineers and Managers. In 1911 he was elected a Member of the Institution of Civil Engineers and also a Member of the Society of Chemical Industry.

Mr. Morrison retired to Totnes, Devon, where he interested himself in local municipal, social, and political matters. He was a staunch Freemason, being a member of three Lodges. He leaves a widow, one son, who is Manager of one of the Works of the Nottingham Corporation Gas Department, and a daughter.

AN ARTIST IN GAS STOVE CONSTRUCTION.

Contributed by B. R. Parkinson, M.I.Mech.E.

In the sudden and untimely death of Mr. F. A. Hickinbottom, foreman pattern maker and designer to the Parkinson Stove Company, Ltd., the gas industry has lost a devoted worker, whose name should be placed on record. For twenty-nine years Mr. Hickinbottom has been closely identified with the growth of the Company, and was responsible for most of the pleasing designs which have been a unique feature of its products. His ingenuity and research in burner construction



also led to numerous inventions and patents of considerable value.

Mr. Hickinbottom was born in Derbyshire, where he served an apprenticeship to the craft in which he was afterwards to distinguish himself. Following periods of service in the Midlands and in Glasgow, he came to the Parkinson Stove Company, first at the old works, and then at the fine new works at Stechford. In order to qualify himself the better for his original work, he studied in the evening classes at the Schools of Art both in Glasgow and Birmingham—design, modelling, and kindred subjects. He took a particular interest in decorative art as applied to ornamentation of interiors, a subject which he studied very extensively. He had also a comprehensive knowledge of various periods and fashions in design, more particularly in connection with English furniture, grates,

and registers, frequently paying visits to museums and other places likely to contain good examples. It was thus that he was enabled to give such distinctive features to the various patterns of gas fires, &c., which have contributed so largely to the success of the Parkinson Stove Company. Much of his designing work was pursued after working hours, either in the experimental room at the works or at home, and so unostentatiously that few realized during his lifetime the extent of his devotion to the interests of his firm. Neither was he one to seek the rewards which are due to the pioneer and inventor.

In the year 1927, he somewhat reluctantly (owing to domestic reasons), acceded to the request of the Directors to go out to Australia to supervise the equipment and starting of a new factory at Melbourne, a duty which he carried out with his usual thoroughness, earning the special thanks of the Directors. He had also borne the burden of preparation at home for this new venture, and there is no doubt that the strain on his health had something to do with the breakdown that followed not long after his return. It was during his sojourn in Australia that he occupied his spare time again in designing and making the drawings for the firm's now famous " New Suburbia " cooker. The principal ideas embodied in these drawings were worked out on his return, and Mr. Hickinbottom's name is included in the patents taken out for this stove with its unique features of oven control.

During the war Mr. Hickinbottom served in the Special Constabulary, being one of the first to enrol in Birmingham. He was promoted to Section Leader and then to Sub-Commander, a rank which he held until his death. He took a special interest in first aid work, and received the thanks of the Birmingham Watch Committee.

On the works at Stechford he was much beloved, and his quiet influence was such that the men would do anything for him in the carrying out of their duties. He was absent from work only one week when his last illness terminated fatally at the age of 57.

This is the brief record of one of the quiet workers who has contributed much to the development of the gas industry in his particular line. Labouring always unselfishly, he gave not only his best but, it may be said, his life in the service of his firm. Mr. Hickinbottom leaves a widow and two sons, the younger of whom was assisting his father, and remains at Stechford; the elder son, Dr. W. J. Hickinbottom, is Lecturer in Chemistry at the Birmingham University, and has the degrees M.Sc. (Hons.), Ph.D., and F.I.C.

SOCIETY OF BRITISH GAS INDUSTRIES.

Council Meeting.

A Meeting of the Council was held at No. 56, Victoria Street, Westminster, S.W. 1, on Thursday, Oct. 17—Mr. C. A. Goodall, the Chairman, presiding. Those present were: Major Richard Miles, Messrs. R. J. Milbourne, F. J. Gould, G. J. Jackson, B. B. Waller, C. R. F. Threlfall, G. Clark, H. E. Bennet, W. J. D. Howell, S. Cutler, Frank West, G. Ewart, Ernest West, H. M. Thornton, D. M. Gibb, E. J. Davison (Hon. Secretary), and Arthur L. Griffith (Secretary).

Apologies for absence were reported from Dr. E. W. Smith, Col. E. A. Wilson, Messrs. J. W. Scott, R. B. Hodgson, E. J. Fox, and F. C. Tilley.

The Chairman referred in feeling terms to the death of the following Members: Mr. Henry N. Bickerton, Chairman and Founder of the National Gas Engine Company, Ltd., and Mr. H. Douglas Brown, Managing Director of Metropolitan Gas Meters, Ltd.

The Members rose in their places as a mark of respect.

The following were appointed the Society's Representatives on the Gas Industry Committee of the British Engineering Standards Association: Messrs. C. A. Goodall, Frank West, R. J. Milbourne, and E. J. Davison.

The Chairman reported that he attended the meeting of the National Gas Council, Gas Safety Committee, on which the Society is represented, when the report of the evidence which Mr. Goodenough was going to give before the Board of Trade Committee was approved.

The Chairman reported the meeting of the Joint Gas Conference Committee, and outlined the programme arranged for the Conference on Feb. 18, 19, and 20, 1930, at the British Industries Fair, Birmingham. It was decided that the paper to be contributed by the Society should be on " Gas Lighting." Good progress in connection with the Gas Industries Section at the 1930 Fair was reported.

The Chairman reported the meeting of the Joint Committee with regard to the Gold Medal Awards to Gas Salesmen's Circles. The British Commercial Gas Association will draft the Rules to be considered by the various Salesmen's Circles, and afterwards submitted for approval by the Council.

The arrangements for the Autumn General Meeting on Wednesday, Nov. 20, were reported. The Chairman will give a paper on " Coal Handling " at the meeting.

GAS STOCK AND SHARE MARKET.

[For Stock and Share List, see later page.]

The general tone of the stock markets was decidedly better last week. Anxiety still exists regarding the outcome of the Hatry collapse, but it is believed that all possible steps have been taken to meet the settlement position.

The break in stock prices on the New York Exchange caused considerable excitement, and trading took place both before and after the House hours. English holdings of American securities are comparatively small, however, and little anxiety is felt as to the outcome of the slump.

The dominating feature of the week was the buoyancy in investment stocks, for which the persistent advance in the sterling-dollar rate and the repatriation of funds from America were mainly responsible.

A fair amount of business was transacted in the Gas Market; but while some prices appreciated—the most important of which was the Gas Light ordinary with an advance of 4½d. to 18s. 6d.-19s.—there were one or two unsatisfactory falls, particularly a further drop of 15 points in Imperial Continental capital stock and 3 points in Croydon maximum dividend stock. The prosperity of the gas industry is clearly shown by the announcements during the week of further issues of stock. Among the more important of these are: The Uxbridge, Maidenhead, Wycombe, and District Gas Company, who offer for sale by tender £33,700 5 p.ct. perpetual debenture stock at a minimum price of £90 p.ct., yielding at that price £5 11s. 1d. p.ct., and £20,000 ordinary stock at a minimum price of par, yielding, on the last rate of dividend, £7 p.ct. The North Middlesex Gas Company offer for sale by tender £38,220 6 p.ct. standard consolidated stock at a minimum price of £112 p.ct., yielding, on the last rate of dividend (7½ p.ct.), £6 13s. 11d. p.ct. The Tunbridge Wells Gas Company also offer by tender £25,000 sliding-scale stock at a minimum price of £106 p.ct., yielding, on the last rate of dividend (£7 4s. p.ct.), £6 15s. 10d. p.ct.

The following transactions were recorded during the week:

Monday.—Commercial 93, Croydon sliding-scale 103, European 13½, £13 16s. 6d., Gas Light and Coke 18s. 3d., 18s. 3¾d., 18s. 4½d., 18s. 6d., 18s. 6¾d., 18s. 7½d., 4 p.ct. pref. 71½, 3 p.ct. deb. 57½, Imperial Continental 377, 377½, 380, 381, 382, 384, 386, South Metropolitan 6 p.ct. pref. 106¼. Supplementary prices, Associated Gas and Electric " A " $63½, Barnet 4 p.ct. deb. 71¼, Croydon 7 p.ct. deb. 99½, Peterborough 7 p.ct. 87, Woking 8 p.ct. pref. 102.

Tuesday.—British 115, 116, European 13, Gas Light and Coke 18s. 1½d., 18s. 3d., 18s. 6d., 18s. 7½d., 4 p.ct. pref. 70½, 71½, Imperial Continental 365, 370, 372, 373½, 375, 377, Liverpool 7 p.ct. pref. 100, Maidstone 5 p.ct. 124½, Montevideo 106½, 107, Plymouth and Stonehouse 5 p.ct. 111, San Paulo 6 p.ct. pref. 8⅞, South Metropolitan 99½, 100½, South Suburban 5 p.ct. 102¼, Southampton 5 p.ct. 78, 78¼. Supplementary prices, East Surrey 5½ p.ct. pref. " A " 92, Metropolitan (of Melbourne) 8⅞, Yorktown and District new 5 p.ct. pref. 82½.

Wednesday.—Bombay 18s., Croydon sliding-scale 105¼, 106, European 12½, 13, Gas Light and Coke 18s. 4½d., 18s. 6d., 18s. 6¾d., 18s. 7½d., 3 p.ct. deb. 57½, Imperial Continental 370, 372, 372½, 374, 375, 377, 378, 379½, 380, 381, 381½, 382, 382½, 3½ p.ct. deb. 72, Montevideo 106½, San Paulo 6 p.ct. pref. 9, South Metropolitan 99¾, 100. Supplementary prices, Metropolitan (of Melbourne) 8¾, Yorktown and District new 5 p.ct. pref. 82.

Thursday.—Barnet 7 p.ct. max. 114, European 13¼, Gas Light and Coke 18s. 4½d., 18s. 6d., 18s. 7½d., 18s. 9d., 3 p.ct. deb. 57½, 58, Imperial Continental 372, 373, 375, 377, 378, Montevideo 107¾, Primitiva 33s. 1½d., South Metropolitan 99¾. Supplementary prices, Cheltenham 5 p.ct. 66¾.

Friday.—Alliance and Dublin 97¾, British 115, 116, Cape Town 9⅜, Cardiff 100, Gas Light and Coke 18s. 4½d., 18s. 6d., 18s. 8½d., 18s. 9d., 4 p.ct. pref. 72, 72½, 73, 5 p.ct. deb. 100, Imperial Continental 368, 370, Montevideo 107¾, Newcastle 3½ p.ct. 16s. 6d., Portsmouth 5 p.ct. max. 81, 82, Primitiva 33s. 6d., South Metropolitan 3 p.ct. deb. 55, South Suburban 5 p.ct. deb. 94. Supplementary prices, Barnet 5 p.ct. deb. 95, Bristol 4 p.ct. new deb. 73.

The feature of the week in the Money Market was the keen demand for the new Treasury Bills. No less than 78 millions were applied for, and the average rate of allotment, by comparison with the previous week, dropped 4s. 2d. p.ct. to £5 19s. 4·65d. p.ct., and Discount rates were easier in consequence. Money was plentiful as is usual at the week-end, and 5 p.ct. was charged for both old and new loans.

The Bank Rate is 6½ p.ct., to which it was raised from 5½ p.ct. on Sept. 26.

"B.C.G.A." EASTBOURNE CONFERENCE.

Oct. 28, 29, 30, 1929.

[The General Report of the Proceedings will appear in the "JOURNAL" for Nov. 6.]

PRESIDENTIAL ADDRESS.

The Salesman and the Engineer.

By FRANK HARDING JONES, M.Inst.C.E, Chairman of the Eastbourne Gas Company; Chairman of the Wandsworth, Wimbledon, and Epsom District Gas Company.

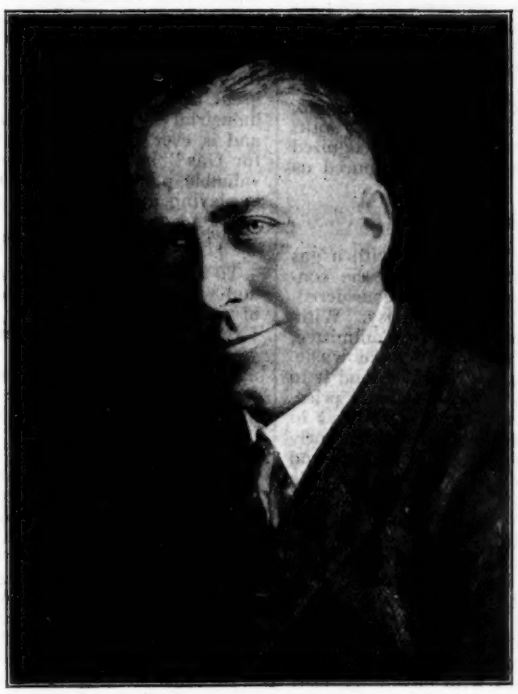
We are meeting here in Eastbourne for the Eighteenth Annual Congress of the British Commercial Gas Association. This eighteenth congress is being very highly honoured, for this afternoon we are to be visited by Their Royal Highnesses the Duke and Duchess of York.

Our Royal Family, as we all know so well, are deeply interested in all industrial matters, and the Duke and Duchess of York have especially devoted themselves to the furtherance of the movement which is described by its title of "Industrial Welfare." We shall welcome them for their gracious act in coming and showing interest in the work of a great, old, and useful industry—an industry in which the relations between employers and employed are of the happiest; one that supplies, moreover, a necessity of life in over nine million homes in this Great Britain of ours, which means that out of every hundred homes, gas is giving service in over ninety. Our Association not only helps this great home industry, but it is supported by, and tries to help, gas undertakings in Australia, New Zealand, South Africa, Canada, and other of our overseas Dominions.

HUMANE WORK OF THE GAS INDUSTRY.

Their Royal Highnesses will be here, as we, one and all, are, not for social gratification, but as an earnest of supporting what is surely a great industry, a great though intelligent user of coal, a great employer of labour, and an industry which is trying its best to help to provide humane and human comfort. Humane because, taken as a whole, we, the gas industry, have tried for many years to make labour healthy and comfortable for our workers; human because we supply a commodity which is necessary, and a great saver of drudgery in every home and in every factory where it is available.

Millions of working men's wives and daughters have had daily cause to bless gas ever since the slot meter made the



THE PRESIDENT,

Mr. Frank Harding Jones, M.Inst.C.E.

Mr. Frank Harding Jones represents the third generation of his family which has held prominent positions in the gas industry. He is an engineer of wide experience, apart from his work in the industry. He was educated at Rugby, later becoming an articled pupil and afterwards an assistant to the late Sir John Wolfe Barry. Under Sir John Barry he worked on the Tower Bridge, and the underground railway in Glasgow. In 1896, Mr. Jones became a partner with his father, the late Mr. Henry E. Jones, Past-President of the Institution of Civil Engineers. Since that date Mr. Frank Jones has spent all his time in organizing and managing gas and water companies. He is Chairman of the Eastbourne Gas Company, and of the Wandsworth, Wimbledon, and Epsom District Gas Company, the two undertakings who are joint hosts of the Eastbourne Conference. He is also the Vice-President and Joint Managing Director of the South Metropolitan Gas Company, and holds important positions on the Boards of numerous Gas and Water Companies in Great Britain, and is a Director of one Gas Company in Malta, and two others in South America.

cleanly drudgery-saving gas cooker and wash-copper, and the safe as well as brilliant gas light, available in the homes of the people. That is a fact often forgotten or conveniently overlooked in these days when a rival industry is the spoilt child of politicians, who talk as if the dirty coal fire and the cheap oil lamp still reigned in the working man's home. What, during this past 25 years, has lightened "mother's" daily task within the home, what has drawn back the curtain of smoke from the skies without—to the greater advantage of her children's health and her own—but gas in its quiet efficient way? We are very glad to think that to-morrow our friend Mr. Arthur Hayday, whose services to his fellow workers are known to all, will be talking to us at greater length than I can now, on this subject of what gas has done for the worker, his wife, and his family.

Referring again to the humane side of our industry within its own walls, there is one name which must go down in history as that of a very humane person, George Livesey, who has been well described as an "industrial statesman." It is my pleasure and honour to be one humble person among many who try to follow in his footsteps. George Livesey saw in very early days that health, holidays, care during sickness, pensions, and co-partnership were as much necessary as mere profit and dividends.

Improving Conditions for all Workers.

We, the gas industry, can claim to have thought of our workers as much as, if not more than, most large employers of labour. But it is in the far larger field of improving working conditions for the operatives of all industries that our chief claim in that direction lies. The use of gas in factory and workshop means a moderate temperature for the worker in any heat-treatment process, and clean conditions for all; its use in canteens means prompt, well-cooked meals; and in staff cloakrooms and elsewhere a constant supply of hot water for personal cleanliness is ensured. These are but a few of our services to the worker; but it is upon such as these that we do claim to have made the ideal of factory welfare realizable. I believe it is for this reason that H.R.H. the Duke of York, as President of the Industrial Welfare Society, has recognized the value of our work in this direction, and has honoured us with a visit.

The Meaning of "Service."

To-day there is no responsible person connected with a gas undertaking who does not clearly understand that the consumer of gas is the most important person to be considered. Give the consumer "Service," and all the rest is easy. Without a policy of true "Service" the best Board or Committee, the best staff, the best plant and personnel are mere waste. "Service." What does that word mean? I understand it to mean supplying a required commodity at an economic price, educating and instructing the customer as to all the ways in which the commodity can best serve his interests, and regularly keeping in touch with all consumers and their apparatus and their needs. "The consumer pays;" and indeed he does. He pays for everything; therefore he is the first person to be considered. Without the consumer, who would pay the wages bill, the coal bill, and all the other bills we have to meet, and who would pay the dividends and interest on the many millions of pounds expended on plant in the gas industry? Looked at in this way, do we not all agree that the consumer of gas is the really important factor, and that it is the friendly, satisfied customer that we want, not the disgruntled, reluctant customer who only takes the minimum of our commodity that he must have, instead of the most that he might with advantage use?

Don't we all know the difference between the shop we like going into and the one we are glad to get out of? I have often heard it said of some particular undertaking: "We sell gas cheaply, we give good service, we have good showrooms, &c.—Why this outside Association?" My answer is that a satisfied consumer in Perthshire has an effect on gas consumers throughout the whole of the land. Conversely, a thoroughly dissatisfied consumer in Cornwall or Norfolk—or London or Eastbourne—has a bad effect also in every gas area in our land.

If it were possible to have perfect "Service" everywhere, there would be no use for the British Commercial Gas Association—provided that "Service" included, as I have said, the complete education of every actual and potential customer. Who of us thinks this ideal position exists? I most certainly do not. What is the justification for our Association? It is "to promote the commercial prosperity of the gas industry by co-operative action"—and this includes not only all branches of propaganda and publicity work among the public, but educative work throughout the industry for the increased efficiency of gas service everywhere.

Gas Lighting can Hold its Own.

The uses for which gas is to-day installed are so many and various that one rarely passes a week without reading of some new process which calls gas to its aid. I read the other day that the food for the crew of a large United States airship was cooked by means of a gas cooker installed in its galley. This being so, one asks, Where cannot gas be used? What an incentive for the gas sales manager and his staff!

In all the new homes for gas apparatus which are being found, we must not lose sight of some of the older purposes for which gas in its infancy was used—and is still being widely used in the 117th year of its existence. The gas industry had for its first objective "Lighting." It was as an illuminant that its foundation was laid. It was as an illuminant that our whole fabric as an industry was built up. There are means to-day of lighting streets, workshops, large open and enclosed areas, shops, houses, and, in fact, almost anywhere that artificial lighting is necessary, which far exceed in efficiency and economy anything ever dreamt of even 25 years ago.

I believe most of us who have to deal with the gas industry realize how efficient and how popular good modern gas lighting can be—and by "good" I mean well installed and efficiently maintained—but there are some of the general public who seem to think that gas lighting cannot compete with electric lighting. On its own merits as an illuminant, gas for most lighting purposes can more than hold its own, and I would urge those who doubt this fact to pay visits to places where care has been taken to show what gas really can do in this large and varied field.

Gas, like any other commodity, of course, cannot succeed if it has to meet unfair and subsidized opposition, and it is this form of opposition which to-day has to be faced in many localities. I believe, however, that with good "Service" (including good propaganda) gas will long remain the principal method of providing cheap and efficient artificial light. May I say that I regard it as a crime against the eyesight of mothers and children to persuade the poorer to substitute a light of which they cannot afford to burn enough for the thorough lighting of their homes for incandescent gas lighting, of which they can afford to use enough to enable a woman to sew, or her children to read, without strain on their eyes. From the heating and cooking load which has come to us, we have a great future, if again we always remember "Service." For industrial purposes, the field is a large and truly wonderful one, and is ever becoming greater. "A Thousand-and-One Uses for Gas" is no fancy title for our publication—and a very valuable publication at that. It truly describes the part gas is playing in industry in daily increasing measure.

Reasons for Our Industry's Growth.

To my mind the past is a good book to keep one's eyes on; and when we realize that during the past ten years the sales of gas in this country have been increased by over 30 p.ct., I think we have every reason for confidence, especially when we remember those past ten years have not been a period of abnormal prosperity, and also when we take into account the fact that most apparatus installed in that period is more efficient and more economical than much of the plant used in years gone by.

Looking at the history of our industry during the past decade, as I have said it shows steady annual increases in the services given by gas. The same tale is told if one studies figures from the Continents of Europe, America, Asia, Africa, and Australasia. Many of you, like myself, must often be asked: "How is it the gas industry still grows in face of its many competitors?" My answer always is: "We use a ton of coal more economically—*i.e.*, more productively, with much less waste—than anyone else, and we try to give 'Service' all the time." There are many other reasons, but surely these are the two main factors.

Included in "Service" there is one great benefit we give automatically, and that is reduction of smoke in our cities. We must all have noticed how clean the air of many towns has been when on several occasions coal has not been available for air pollution from the open grate. I myself on one occasion stood on the Downs above this town of Eastbourne when hardly any coal was to be bought, and there was smoke coming from only one chimney. That smoke was coming from coal sold by the Gas Company to our friendly competitor, the Electricity Works of the Eastbourne Corporation, as we had plenty and they were short. Perhaps our coal was not suitable!

The hours of sunshine each year here in Eastbourne are more than in most towns in England. I venture to think those hours of sunshine would be far fewer if the 15,500 consumers of the Eastbourne Gas Company used raw coal in place of gas. They could be even greater than they are if all users of raw coal in Eastbourne used gas or coke!

When you did me the honour to ask me to be your President it was, I believe, because I was Chairman of the Wandsworth, Wimbledon, and Epsom District Gas Company. There is not a suitable place, in my opinion, for such a congress as this in our Wandsworth area, and so, as I happen to have been connected with the Eastbourne Gas Company for many years, we thought this was a fitting town in which to have our annual meeting. I hope you are satisfied.

Local Service.

The two Companies are combining to try to make your visit a profitable and comfortable one. I do not propose to weary

you with a long dissertation on the virtues of these two Gas Companies who are your joint hosts to-day. I should just like to say that they both welcome you all very heartily to this congress. The two Companies—each in its own area—have for many years sold gas very cheaply compared with their neighbours, and I can only claim for them that the idea of "Service" is always right in the forefront of their prospective programmes and daily routine. There is just one similarity between these two Companies which must be, I think, almost unique. During practically the whole of their histories they have had only four Chairmen each. (Wandsworth for over 90 years—Eastbourne for 67 years.) If I had been speaking only four years ago, the number of Chairmen would have been three to each Company. But not only in their Chairmen have these Companies had great continuity, but in both Companies to-day there are Directors, high Officials, and many of the staffs and workmen who have spent most, if not all, of their working lives in the employ of one or other of the Companies. This fact has been in no small degree responsible for each Company being in its present position, which I hope is in the forefront in our industry.

The Work of the "B.C.G.A."

Coming back to our Association, I should like to put on record my own views after serving a year as your President. I have learnt a great deal. I am confident that the work begun eighteen years ago has borne, and is bearing, good fruit. Of course it is not perfect. Nothing human is, or ever will be; but as each year goes by, the British Commercial Gas Association is doing more for the good of the British gas industry.

If any of us feel that their own particular undertaking can get on without the Association, I ask them just to think of the large number who cannot. If it be in industry as in friendship, there generally comes a time when the helping hand of a big brother is useful; and if I see things clearly, this Association should, and can, offer a true helping hand to many in the gas industry. And I think it would be difficult to find any undertaking that does not, consciously or unconsciously, benefit by the Association's widespread work for all.

The Importance of a Selling Policy.

I was born and brought up a gas engineer, and I yield to no one in my pride in the profession of engineering. But for a good many years now I have been realizing, with ever-increasing conviction, that what we in the gas industry need in these days is to put selling policy and service policy—the two are really one—in the forefront of our minds, and to remember that if you can't find and keep customers, you won't have any call to make gas.

We are engaged in commerce, highly competitive commerce, too; and we must shape our policy on that clear understanding. We want skilled engineers; we want skilful chemists; but above all to-day we want skilled salesmen.

If it were possible, I should like to see more work done in the education of future men for the sales side of our industry, and certain standards of knowledge and training set up. Many undertakings are doing much in this direction to-day in many excellent ways, but if some much closer and more comprehensive scheme can be started, it will be a profitable investment on the part of our industry. The Education Scheme of the Institution of Gas Engineers is making steadily for a higher standard of technical knowledge on the supply as well as on the production side of our work, but much remains to be done on the commercial side apart from the technical equipment of the salesman.

Because we are becoming increasingly conscious of this need, we are particularly pleased as well as honoured to have with us this morning as our chief guest and speaker, Lord Eustace Percy. No one more zealous for the cause of sound education for all classes of the people has occupied the position of President of the Board of Education than Lord Percy, and we had clear proof of his realization of the need for more effective education for commerce when last year he appointed the Committee on "Education for Salesmanship" in its widest sense to conduct, as he put it, an inquiry into the whole field of higher education from the standpoint of the business man.

All of us in the gas industry were gratified that for the chairmanship of that Committee, Lord Percy selected the Chairman of the Gas Education Committee (and of this Association). We are all looking forward with interest to the results of that Committee's labours—not with mere friendly interest, but because we want help towards solving our own problem of staff recruitment.

Attracting Brains to the Industry.

We must attract to our service brains that have enjoyed both good general education and sound commercial and technical training—or that having had the one are ripe for us to give them the other—and, the world being what it is, the attraction must be the certainty of a position in life which provides work of an attractive kind with an emolument of the order that will secure for and retain in our service those having such qualifications. If we want, as we do want, well educated officials of the best type, those possessed of attractive personality and sound character as well as of brains and education, we must be prepared to pay a fair price for them. It would, I think, be shutting our eyes to facts if we did not recognize the fact that it is sometimes difficult to find the right man for our commercial business, largely I think because we have not given sufficient evidence that we are willing to employ and value them; and it will be well when we can have, on the one hand, some standard or diploma which will be a guarantee that the person has had definite training for the particular position to be filled, and, on the other, a sufficient demand by employers for such trained men at the price they are worth.

"Making" Our Salesmen.

The business man has got to be trained, as has the technical man, and not allowed merely to grow up. The salesman may be "born," but he has also to be "made."

One does not like to keep using the same word over and over again, but the word "Service" which I have used so freely is one we must never forget. If anyone will take the trouble to read through the Addresses of our Past-Presidents, he will find "Service" is the theme of them all; and the word occurs in the first and last addresses given. It will be a bad day for our industry when "Service to the Public" is not our slogan—and not only our slogan but our inmost conviction and guiding principle. And because the "B.C.G.A." has stood for that principle from its very birth, I stand here to-day to give it my support.

I have purposely tried to make this Address short, as we have a great deal of important work to do at these meetings; and I will now in conclusion ask you all to join with me in giving our best thanks to the Mayor and Corporation of Eastbourne for their great kindness and hospitality. This is a beautiful town, and has always been governed by a Corporation of foresight and ability. The Corporation and the Gas Company have always worked together in a friendly way; and I hope they always will. I personally want to thank a great many people for their kindness to me during the past twelve months. Mr. Goodenough, our Executive Chairman, has given eighteen years of hard work to our Association; and to him the thanks of the industry are due. We of the Association know well the quantity and quality of that work. Mrs. Cloudesley Brereton, our Editor and consultant, does not perhaps have to do so much talking as some of us, but her pen sends information further than our voices, and her work and counsel behind the scenes are invaluable to us all. Mr. Mason and Mr. Walker, our Manager and our Secretary, know their work from A to Z, and are most zealous and valuable officers. There are many more who deserve thanks, but they are too many to name in person.

In handing over my position to Mr. Henry Woodall, I shall do so with great confidence. Mr. Woodall has great knowledge of and many interests in the gas industry, and will add yet another illustrious name to our list of illustrious Past-Presidents, of whom his father, the late Sir Corbet Woodall, was the first. To me it has been a great pleasure and honour to be your President, being of the third generation of my family closely connected with the gas industry, and, speaking as one who has the gas industry absolutely first in his mind, I feel, after what I have seen and learnt during my year of office, even greater faith, if possible, in the future than I ever felt before; and I am confident that our Association is going to play an ever-increasing part in helping to carry on a great, useful, and honourable industry to even greater achievements in the service of the nation.

Patents Committee.—The Committee, which was set up under the Chairmanship of the Right Hon. Sir Charles Sargant to consider whether any amendments in the Patents and Designs Acts, or any changes in Patent Office practice, were desirable, are continuing their meetings at the Board of Trade for the purpose of hearing evidence from interested persons and associations. Four meetings of the Committee took place before the vacation, and during the next few weeks evidence will be taken from representatives of Trade Marks, Patents, and Designs Federation, Ltd., the British Science Guild, the London Chamber of Commerce, the International Association for the Protection of Industrial Property (British Group), the Association of British Chemical Manufacturers and the Chartered Institute of Patent Agents. Any persons or associations who desire to submit any further suggestions, or to give evidence, are invited to communicate with the Secretary, Mr. R. W. Luce, Industrial Property Department, Board of Trade, 25, Southampton Buildings, W.C. 2.

EIGHTEENTH ANNUAL REPORT OF THE "B.C.G.A." GENERAL COMMITTEE.

The General Committee presents to the Members, Associated Members, the Administrators of Gas Undertakings, and the Members of the Society of British Gas Industries subscribing to the Association, their Eighteenth Annual Report and Statement of Accounts. The Report covers the immediate past twelve months, and the Accounts cover the year ended March 31 last.

Income and Expenditure.

The audited accounts for the financial year ended March 31, 1929, show that the Association's net income has increased by £14,400 over the previous year, and £23,600 over the year ended March 31, 1927.

It is satisfactory to report that, while the increase in income for the year under review includes the sum of £9700 contributed by gas supply undertakings in response to the appeal for an extra 1s. 6d. per million to augment publicity in the national and district press, nearly £4000 of the total increase was received from (*a*) additional contributions on the 6s. per million basis; (*b*) increased contributions from partial subscribers; and (*c*) an increase in subscriptions due to increased make of gas.

The balance of increase—namely, £1000—represents a special contribution towards the cost of the Association's "Refrigeration by Gas" campaign.

The total income for the year exceeded the total expenditure by £6 8s. 1d., and the debit "balance carried forward" has been reduced by that amount.

Growth of Membership of the Association.

There has been an addition of 28 new subscribers during the year, making a total of 851 gas undertakings (excluding overseas members) subscribing to the Association. These represent, on the basis of make, 95 p.ct. of the total undertakings in Great Britain and Ireland. During the year, 22 gas undertakings increased their subscription to the basic rate. There are now only 51 subscribing undertakings which do not contribute at the basic rate. In co-operation with the District Committees, the efforts of Headquarters to secure the support of the remaining non-subscribing undertakings are being actively continued.

The additional subscription of 1s. 6d. per million for increased newspaper publicity has been agreed to by 187 undertakings, or 50 p.ct. of the total membership as reckoned by make; and, while it is clearly understood that such increased subscription is an entirely voluntary contribution by the undertakings to the national and district work of the Association, it is hoped that, during the current year, the number of undertakings contributing will be substantially increased.

There is real and pressing need for increased publicity for gas, and the whole of the special increase in the Association's income is utilized for that purpose.

National Publicity.

The Association's advertisements have regularly appeared in the large number of national and district newspapers, the popular and society magazines, and the architectural, trade, technical, medical, and educational journals approved by the Committee.

By general consent, the campaign opened in the spring with a new series of "Mr. G. A. Service" advertisements, which appeared in larger spaces than usual, attracted a considerable amount of attention, and gave an excellent "send off" to the campaign.

The spaces used throughout the campaign this year are the largest the Association has used in any of its continued schemes. The layouts were bold and arresting, and the illustrations and "copy" were varied to appeal to every type of home and every class of consumer.

Many members (including some of the largest undertakings) are using these "Mr. G. A. Service" advertisements for their local campaigns.

There has been a steady flow of inquiries throughout the campaign, not only from the general public, but from industry, the catering world, and the architectural and medical professions. Since the Association rarely offers free literature in its national advertisements, it is obvious that the inquiries received are from people who are genuinely interested, and who really desire "gas service." These inquiries, of course, are the right type, and when followed up almost invariably result in business.

Special attention has been given this year to the specialized groups of papers. Doctors, architects, engineers, municipal and education authorities, hotel and restaurant proprietors have all had special advertisements written for them dealing with the uses of gas in relation to their own particular profession. It is impossible here to mention the whole ground that has been covered.

It is hoped to have on view at Eastbourne a set of this year's advertisements from which it will be seen how comprehensive the campaign has been.

The subject of lighting has received special attention alike in regard to editorial and other publicity matter dealing with all sides of the subject supplied to the press or issued to the industry, and to advertisements designed for the use of subscribing undertakings. As the result of special conferences on the subject, arrangements have been made for the inclusion of lighting among the subjects dealt with in district newspaper advertising whenever the District Committees so desire.

Local Publicity.

Requests from members for assistance in connection with local publicity campaigns are increasing. Some hundreds of advertisements, as well as other kinds of publicity material, have been prepared by request since the beginning of the year. It is gratifying to note this increase in local advertising. A new series of illustrations for local use, in addition to the adaptations of the "Mr. G. A. Service" set, is now almost completed for those who desire to use smaller spaces occasionally. Specimens are reproduced in the "Bulletin" for September.

Educational Propaganda within the Industry.

A word may perhaps be said about the immediate future in the light of recent national and international developments, as they appear to affect both publicity and education. There is, we feel, special need for gas managers to see that their staffs are instructed in the latest electrical developments, so that they may answer questions clearly and accurately. The Association will continue to use purely positive propaganda and to keep gas *versus* electricity conflicts out of the press advertisements. But members of the staffs of gas undertakings will have to meet the questions put by consumers and prospective consumers, and these questions are likely to increase as the development of electricity supply proceeds all over the country. It is, therefore, important that while the Association increases its editorial activities to bring scientifically before the public the advantages of gas, managers should give increased attention to the proper instruction of every member of their staffs in those special points with which they will have to deal in the course of their duties. It is proposed to print a series of scientific and economic articles in the "Bulletin" to assist members from month to month.

The last year's press experience has shown, more than ever before, the necessity of these measures, in view of the much more active interest taken by the public in all fuel and lighting questions.

Children's Fairy Competition.

The competition has again been well received in schools all over the country, and over 16,000 children sent in entries. The two £50 scholarships have been won by girls from Cardiff and Lockerbie, respectively. The Senior Section essay dealt this year with two points of domestic hygiene—ventilation and personal cleanliness. Under the first heading, the children had to show some knowledge of the advantages of an open fire with a flue as a means of heating a room, and under the second, were asked to describe means of heating water by gas. The Intermediate Section had to write a short story based on a "new nursery rhyme" about gas, and the Juniors' handicraft this year was paper-weaving. The competition always brings to the judges evidence that the children (or their teachers) have been at some pains to read the gas industry's advertisements and literature for accurate descriptions of appliances and their uses, and we have no doubt that, in many cases, the competition tasks are made part of class lessons.

National prizes are distributed this year between 37 districts in England and Wales, and 16 in Scotland, while 14 members* have offered local prizes in addition to the national prizes.

Special Publications.

Among many other similar activities, special mention may be made of the fact that the Association co-operated with the "Empire Mail" in the production of a special Gas Industry Number, and with "The Times" in the production of their Printing Supplement, and that, at the request of the publishers, we contributed the chapter on "Gas-fitting" to "The Modern Practical Plumber"—a standard reference book in three volumes issued last spring by the Caxton Press.

London School of Hygiene and Tropical Medicine.

In July of this year, the University of London were at last able to open their new building for the School of Hygiene and Tropical Medicine, the opening ceremony being performed by H.R.H. the Prince of Wales.

In co-operation with the Gas Light and Coke Company, the Association has provided an extensive exhibit to illustrate the uses of gas for domestic purposes, with special reference to hygiene. The exhibit in the Museum of the School consists of a showcase containing a series of "cut-out" pictures illustrating various types of kitchens, and a scroll setting out briefly the history of cooking from the stone age to the present day. In the Library there are three large albums containing pictures and descriptions to illustrate the history of cooking in much greater detail; the twentieth century volume being illustrated by photographs and the other two by specially prepared drawings and by reproductions of old prints.

In the basement of the building there is an exhibit of full sized gas appliances—cookers, fires, water-heaters, incinerators, sterilizers, &c.—presented by various gas appliances manufacturers, and a fourth volume of illustrations showing pictures of modern domestic gas appliances of all kinds installed in suitable surroundings. Manufacturers have also been permitted to supply specially prepared gas leaflets. The whole of the basement exhibit was planned by the

* Altrincham, Birmingham, Bradford, Calverley, Dartmouth, Elland, Great Grimsby, Hessle, Lancaster, Leiston, Newport (Mon.), Southampton, Taunton, Wakefield.

experts of the Gas Light and Coke Company, in conjunction with the Association's Consulting Architect, Mr. H. Austen Hall.

National Association for the Prevention of Tuberculosis.

The Association has been able, through members of the Council of the "N.A.P.T.," to approach that body and persuade it to revise certain of its leaflets which contained inaccurate statements derogatory to gas.

Public Lectures.

The lectures and material prepared for the assistance and use of members giving addresses to local clubs and societies have been in good demand, and the Association has also received, and accepted, many invitations for putting the case for gas before rotary, publicity, and similar clubs, in various parts of the country.

These lectures and addresses constitute a valuable form of propaganda, backing up and driving home the industry's general publicity, and while there is a limit to the number of organizations which the Association's representatives can address, the officers are always pleased to assist individual members who are giving such addresses.

Service to Members.

The growth in the amount of individual service given to members shows a continuous increase, and it is impossible, within the confines of this report, to indicate even a fraction of the number and variety of subjects dealt with.

The General Committee feel, however, that an expression of appreciation of the ready and thorough manner in which the Association's technical representatives on the one hand, and the editorial management on the other, deal with inquiries and problems put to up to them, will be endorsed by all members.

Sales of Publicity Material.

The sales of publicity material during the past year have exceeded all previous records, and, as the result of this continued development, the Association is enabled to buy on an increasingly larger scale, with a resulting beneficial effect upon the rates at which material is offered to members. Such a developing market, moreover, permits of the production of a wider range of publicity material in the assurance of a satisfactory demand, and during the year a greater selection of material has been offered to members than in any previous year.

District Conferences.

Valuable publicity has again been secured this year through the District Conferences which have been held in Scotland (at Aberdeen), in the Midlands District (at Cheltenham), and in the Manchester District (at Southport). At these conferences special endeavour was made to focus public opinion on the important subjects of gas in relation to health and air pollution; and the Association was particularly fortunate in enlisting the practical support of influential members of the medical profession and other public men who presented papers and took part in the discussions. The conferences were well attended, and satisfactory reports were secured in the local and district newspapers.

District Meetings.

During the past year, meetings of the District Representatives have been held in all districts, and have provided a valuable opportunity for the consideration of points of policy and other matters relating to the activities of the Association. The discussions have been of considerable assistance to the Committee in framing new, or adjusting existing, policy, so as best to meet the needs of the districts.

Gas Salesmen's Circles.

The work of the Committee of Inquiry into "Education for Salesmanship" set up by His Majesty's Government and presided over by the Executive Chairman of the Association, focusses attention on the Gas Salesmen's Circles and the steady but increasing influence the Circles are exerting in raising the standard of salesmanship throughout the gas industry. The Circles are now commencing their sixth year of operation, and it is necessary for the senior members personally to attend one or more Circle meetings before they can appreciate thoroughly the high degree of enthusiasm which animates the meetings, most of which are held outside official hours.

It is gratifying to observe in this connection that the administrators and chief officers of gas undertakings are, in increasing measure, giving outside assistance to the work of the Circles by inviting them to hold meetings in the gas undertaking's premises and, in some cases, providing hospitality and taking active part in the discussions. Such sympathetic co-operation is much appreciated by the members of the Circles and is an important service to the industry.

Study of the past year's programmes indicates a wise choice in the nature and variety of subjects chosen for discussion, while the excellent support given by the Technical Press in publishing reports of all meetings, enables the salesman to profit from the discussions at Circles other than the particular Circle of which he is a member. These reports show a steady improvement in the standard, both of the class of paper presented and of the contributions to the discussions, which augurs well for the future of salesmanship in the industry.

Interest in the forthcoming session is intensified by the offer of two gold medals for the best papers presented during the twelve months ending Dec. 31, 1930.

The two donors of the medals, to whom the General Committee, on behalf of the Association, have expressed thanks, are the Executive Chairman, for the best paper dealing with the "human relationship" aspect of salesmanship—in other words, with the relations between an undertaking and its consumers; and the Society of British Gas Industries for the best paper of a technical character.

A small Sub-Committee has been formed to frame the conditions under which the awards will be made.

British Industries Fair.

The Gas Industries Section of the British Industries Fair (Birmingham) has developed into an important feature of the national activities of the gas industry, and the Association again co-operated in the organization of the Section in February last, both in the direction of Press publicity and in the presentation of a striking display on the subject of smoke abatement and coal conservation. Assistance was also rendered in connection with the important Joint Gas Conference held at the Fair.

At the London Fair, held simultaneously with the Fair at Birmingham, good practical advertisement for gas resulted from the large installation of gas fires for the heating of the whole of the buildings in which the Fair was held.

Building By-Laws and the Ventilation of Habitable Rooms.

Negotiations with the Ministry of Health on this important matter were taken a step further when representatives of the Association met officials of the Ministry in April last, and many conflicting points of view were discussed and reconciled. As a result of that meeting, it was agreed that the Ministry would endeavour to prepare By-Laws which would obviate the necessity for the promotion of legislation for altering or supplementing existing Acts of Parliament, and that, if this were possible, the Association would prepare a memorandum of instructions regarding the construction of ventilating flues for gas fires which would be circulated to all local authorities.

No concrete proposals have yet been made by the Ministry with whom the Association is maintaining close touch.

Gas Flue Construction.

In connection with the foregoing, reference should be made to the book prepared by Mr. Walter Tapper, A.R.A., F.R.I.B.A., for the Gas Light and Coke Company, and reprinted by the Association, with the Company's kind permission, for the use of the whole industry.

Close upon ten thousand copies of the book have been distributed by members, and, as a result of advertisements and editorial notices in the Press, a large number of inquiries have been received by the Association, not only from architects and builders, but from the general public, who are taking an increasing interest in this subject.

There can be little doubt but that the preparation and distribution of this book will achieve valuable results in ensuring that gas flues are constructed in conformity with approved practice.

North-East Coast Exhibition.

The Gas Section of the North-East Coast Exhibition, Newcastle-upon-Tyne, reflects the greatest credit upon the organizers and upon the Newcastle-upon-Tyne and Gateshead Gas Company in particular. The Association took space at the Exhibition and arranged an educational display, dealing with smoke abatement and bye-products recovery, which has aroused considerable interest among visitors.

In addition to actual exhibits at the Exhibition, the editorial staff has co-operated with the Newcastle undertaking throughout the period of the Exhibition, in connection with newspaper editorial publicity, and a member of the editorial staff has visited Newcastle several times to give personal assistance on the spot.

The Committee are sure that all members of the Association will join in expressing the hope that this Exhibition, designed for the development of trade on the North-East Coast, will more than fulfil the best hopes of the organizers.

The Use of Oil as a Fuel.

Having regard to the increasing competition which the gas industry is experiencing from the use of oil as a fuel, particularly for industrial purposes and central heating, the subject was carefully considered and discussed at a recent meeting of the General Committee, with a view to obtaining and preparing information which would be of assistance to members of the Association.

It is hoped that the report of this discussion, together with other data and information obtained from other sources, will be available for circulation to members prior to, or immediately after, the Annual General Meeting.

In view of possible future developments, members are specially requested to send to Headquarters any further information likely to be of interest and assistance in meeting this competition.

Empire Marketing Board.

The Association and members have again co-operated with the Board in the organizing of cookery demonstrations at important exhibitions in various parts of the country at which the Board has arranged displays of Empire products. Exhibitions of particular importance were the North-East Coast Exhibition, Newcastle-upon-Tyne, and the Ideal Home Exhibition, London, at which the cookery demonstrations arranged by the Empire Marketing Board were all carried out with gas.

The Board have placed on record their appreciation of the assistance rendered by the Association and its members.

International Illumination Congress, 1931.

Mr. F. W. Goodenough, Mr. Robert Watson (Doncaster), and Mr. W. M. Mason, have been elected members of the Council set up by the National Illumination Committee of Great Britain for the organization of the International Conference to be held in Great Britain in 1931. Mr. Goodenough has also accepted an invitation to act as Hon. Treasurer to the Congress.

Vice-Presidents.

The following have been added to the list of Vice-Presidents of the Association during the past year:

Councillor C. H. Bowers, J.P. (Stoke-on-Trent).
Mr. W. Lees Stenning, M.B.E., J.P. (East Surrey).
Mr. R. W. Edwards (Aldershot).

Obituary.

During the year, the Association has lost valuable supporters in the passing of several Vice-Presidents and members. The former include

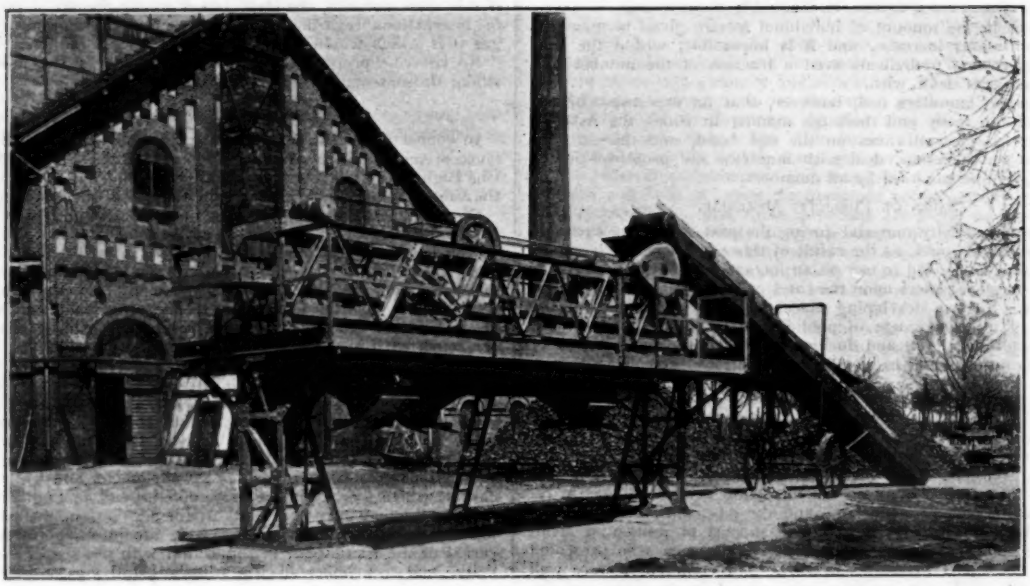
Sir Percy Stothert, K.B.E., late Chairman of the Bath Gas Company; Mr. Charles Hunt, M.Inst.C.E., late Chairman of the South Suburban Gas Company; and Mr. Alexander Wilson, O.B.E., one time General Manager of the Glasgow Corporation Gas Department, and an original member of the Executive of the Association. The members include Mr. James Melrose, a late Director of the York Gas Company, the centenarian who will always be remembered by those who had the good fortune to meet and hear him at the Association's Annual Conference at York; Mr. Joseph Hawksley, a late Director of the Great Yarmouth Gas Company; Provost Allan Reid, of Brechin; Mr. H. Buckley, of Windsor; and Mr. P. G. Winstanley, of Wolverhampton.

The Committee have the pleasure to report that Mr. Henry Woodall, M.Inst.C.E., has consented to be nominated for election as President for the year 1929-30.

(Signed) Frank H. Jones,
President.
(Signed) F. W. Goodenough,
Chairman.

"BAMAG-MEGUIN" SELF-BALANCED SHAKING AND SCREENING UNITS.

Fitted in Coke Handling Plants in Gas-Works and Collieries.



"BAMAG-MEGUIN" COKE SCREENING PLANT.

A coke-dressing plant usually consists of a raw coke hopper, feeding mechanism, pre-classification screen or roller grate screen ("grizzley"), crusher, and actual classification screen.

The "Bamag-Meguin" patented self-balanced shaking screen consists of a solid steel lattice frame supported on rollers, in which the screen boxes—which are completely balanced—are suspended on ash brackets or Manila canes. The screen frame can be freely supported on its longitudinal axle on the rollers without transmitting any vibration to the buildings, to which it is only flexibly connected by unstretched buffer springs. This allows the building to be of considerably lighter construction, without fear of vibration. The "Bamag-Meguin" design not only minimizes the disadvantages, but utilizes them by applying the principle of resonance. By using oscillating and loosely coupled mechanical units the energy used is reduced to a minimum, while the operating efficiency of screen boxes of a given width is doubled. The above advantages ensure that with moist coke the screening is free from coke slack and has only 5 p.ct. of undersize.

The right to utilize the "Schieferstein" oscillation patents permits the control of high screening weights and the application of the most favourable oscillation factor and amplitude for the screening framework, so that maximum operating efficiency, with minimum energy consumption and negligible wear and tear of the machinery, is secured.

The drive in every case is either by a loose coupled gear, which, if required, can be in the form of a connecting rod, or by other suitable means. If arranged as a connecting rod, it consists of a single long rod working horizontally, the eccentric head of which is supplied with automatically adjustable roller bearings running in vaseline and provided with felt packings. For other types of elastic coupling, special gear is provided. The two bearings of the eccentric shaft, arranged on the upper flange of the screening frame, are also fitted with roller bearings automatically adjustable and provided with felt packings.

The screening surfaces are of hard steel sheet plate with circular or square holes, or of wedge wire, and require only wooden brackets and wedges to fasten them in the solid screening boxes, and are therefore easily exchangeable. Any stoppage of the screening holes is impossible even with a diameter up to 4 in.; and instead of an expensive roller grate screen ("grizzley") with its many parts subject to wear and tear, a single plane shaking and oscillating screen is used for pre-screening the coarse coke. This third screen oscillates in the screening structure by resonance, and requires no special drive.

Single screening units can be supplied for an hourly capacity of 60 to 100 tons. In order to increase the capacity, units can be arranged side by side above the classification hoppers, so that each unit can be supplementary, if desired, and held in reserve.

These "Bamag-Meguin" screening units are accessible from all sides and are readily supervised, as all machinery parts are arranged in the upper flange of the screening frame.

Each unit is assembled and tested at the works, and dismantled prior to despatch. Units of this type recently installed show the following advantages: Noiseless operation; no oscillation transmitted to buildings, therefore only light construction necessary; maximum capacity; pure screening; negligible wear and tear; careful handling of the material to be screened; easy supervision (only one connecting rod); roller bearings with felt packings.

Association of Public Lighting Engineers.—The Organizing Committee of the Public Works, Roads, and Transport Congress and Exhibition, which will be held in the Royal Agricultural Hall, Islington, from Nov. 18 to 23, have invited the Association of Public Lighting Engineers to take part in the discussion of papers. Among other subjects, papers in connection with gas supply, street lighting and traffic signalling, and "safety first," will be read. To members of the Association who desire to attend, a complimentary admission ticket and a cheap rail voucher will be forwarded on application to the Hon. Secretary, Mr. W. J. Liberty.

Gas Bakers' Oven at N.E. Coast Exhibition.—In our illustrated description of the Baker-Perkins high-pressure gas bakers' oven demonstrated at the stand of Messrs. Crosby at the North East Coast Exhibition (see "Journal" for Oct. 16, p. 183), the maximum gas consumption was given as 4200 c.ft. per hour; this should be 1000 c.ft. per hour.

SIR DAVID MILNE-WATSON'S PRESIDENTIAL ADDRESS TO THE INSTITUTE OF FUEL.

Presented at the Annual Conference at the Institution of Mechanical Engineers, Oct. 24.

Probably no aspect of our national economy has undergone such a complete metamorphosis in the past quarter of a century as regards both character and complexity as the fuel situation. At the period when I commenced my connection with the fuel industry—some twenty-five years ago—we were enjoying an era of industrial prosperity. The output of our greatest national asset, coal, was increasing by about five million tons annually, about one-half of which was absorbed by a steadily improving export trade. To meet the growing power requirements of industry, individual factories were installing steam plant, remarkable not so much for economy as for reliability and long life. The price of coal, while showing some tendency to increase, was still reasonably low; there was little competition from oil, so that there was little inducement to pay much attention to the disposal of the poorer qualities of coal. In what may be called the coal-treating industries, the prosperity of the iron and steel trades was reflected in that of the coking industry, metallurgical coke fetching a price which so amply paid for the cost of conversion that the finer possibilities of bye-product recovery were of academic interest only. The gas industry found an outlet for its products in lighting and cooking, but the open coal fire for heating and the kitchen range for cooking in winter still largely held the field. Coke was fighting hard against cheap coal of good quality to find a foothold in the home market, and the electricity industry was just beginning to turn its attention to the supply of power as well as light.

Changes Due to the War.

With the war, and the consequent interruption of normal sources of supply, the need for fuel economy and for home fuel production came everywhere to the front. Developments in mechanical, electrical, and thermo-dynamical arts were fostered. In all countries, and particularly in our own, what may be termed a national fuel conscience was awakened after a period of lethargy occasioned by the past years of cheapness and plenty. These factors, with others, had the effect of lessening the demand for coal, with consequent over-production.

I do not propose to weary you with a review of the conclusions of the various Royal Commissions and Government Committees—from the Coal Conservation Committee of 1916 to the National Fuel and Power Committee—that have examined and reported upon the successive crises which have arisen, as the story of their doings has formed the theme of many previous addresses. The tangible results of their efforts are to be seen in the setting-up of the Fuel Research Board and the encouragement given to fuel research generally, the National Electricity Scheme, the inquiry now being held by the Area Gas Supply Committee, and the more enlightened appreciation of the problems and difficulties of the coal industry and of the applications of fuel and power in general.

The National Electricity Scheme.

Of all the fruits of these various inquiries, none has secured greater publicity or more concentrated public attention than the National Electricity Scheme. Though several years must elapse before the results of the intended standardization and centralization of public electricity supply can be fully appreciated and judged, certain results are already being achieved. The application of the best steam engineering practice—large boiler and turbine units working at high pressures and temperatures, in accordance with the best thermo-dynamic principles—and the tendency to make trial of new paths reflect very great credit on the electricity industry, both manufacturing and operating. To have secured an increase in energy output since 1921 of 90 p.ct. with an increase in fuel of barely 25 p.ct. is an achievement which we, as fuel economists, can appreciate and applaud. Nor has this beneficial action reached finality, as even to-day the average fuel consumption per unit generated is nearly 50 p.ct. in excess of the best practice. It is well, however, to bear in mind that these considerations refer only to the public electricity supply undertakings. It is a matter for regret that statistics relating to the vast amount of private electric generating plant, or to the still greater quantity of direct driving power plant, are not available in so detailed a form or of so recent date.

Our Use of Electricity is as Great as in Germany.

The most recent statistics are contained in the Census of Production for 1924, and a perusal of the figures brings to light many interesting facts relating to the use of power. It is, for example, somewhat surprising to find that, of nearly eight million horse-power of electric motors installed, 43 p.ct. were then dependent upon privately generated electricity. It is obvious that the national aggregate electricity consumption must greatly exceed that shown by estimation based only on the sales of the public supply undertakings, and that the national use of electricity must approach much more closely that of Germany and America than pessimists would have us believe.

It is probable that in the course of time a proportion of these private power plants will be shut down and the current obtained from the national lines, but meanwhile they will continue to exist, especially where generation of power is combined with a demand for steam for process work or with the production of steam from waste heat, or with other factors making for extreme cheapness of generation. In addition to private electric generating plant of over 3½ million horse-power, there was at the time of the census plant producing a further 7½ million horse-power for direct driving; the total private power plant being, therefore, 11 million horse-power. This has been developed and replaced according to the requirements, progress, and fortunes of the individual industries. In many cases, as can be seen, electric transmission has been adopted, and this in turn has paved the way for the introduction of the best type of prime mover. The fuel consumption of these plants, as far as can be estimated, shows, however, that there exists here a wide field for the application of the skill of the fuel engineer and chemist. In certain instances, notably at collieries, the quality of the fuel used would render it unsaleable if it had to bear transport costs, but in most cases these industrial power plants were developed in days when coal was cheap, when power charges formed a small proportion of factory costs, and when reliability was the chief asset. In consequence, they have been developed, in many cases, in the wrong atmosphere, if considered in the light of present-day requirements.

Mistaken Anticipation.

To my mind a great mistake is being made by those who see the millennium in the transference of all this generation of power to the national super-stations. In many cases the present methods are highly efficient, being either incorporated in cycles of process operations, or associated with special local circumstances. In some other cases, the application of mechanical stoking, pulverized fuel, higher steam pressures and temperatures, combined with efficient control of operations, would achieve results equal to those of the public electricity schemes, and at a lower cost, especially after taking into account the necessary losses due to transmission of the electricity.

Moreover, the money would be expended not in a standardization of the mechanical and electrical position of the present day, which would have to be retained for (say) twenty years, but in regular advancement from time to time by the substitution of newer plant embodying the improvements gained by these years of experience. As an example, I may mention the position at the various works of the Gas Light and Coke Company. At the gas-works, the generation of steam from heat previously escaping to the atmosphere has been extended so that 60 p.ct. of the total amount of steam consumed is raised in this way. The cost of this steam is less than one-seventh of that raised by fuel-fired boilers, and its ready availability has led to the introduction of electrical generation for works power on a fairly wide scale, inasmuch as, when capital charges are excluded, energy can be produced as low as 0·15d. per unit in the most recent installations, and at not more than double that figure as an annual average cost of generation in all of this Company's fourteen power stations, ranging from 100 to 5000 KW. capacity, which are now supplying 14 million units per annum. At the Company's chemical works a different procedure is adopted; electricity being produced from back-pressure turbine plant and the exhaust steam used for process work. Here, under favourable conditions, the cost of generation is equally low at 0·15d. per unit, excluding the capital costs, and does not exceed an average of 0·23d. per unit. At this works 2½ million units are generated annually.

Thermal Inefficiency.

Admirable, however, as is electricity as a means of transmitting power, as a source of heat energy in general it is thermally inefficient. With the very finest generating, transmitting, and converting apparatus the heat that can be delivered to a consumer must necessarily be under 20 p.ct. of that contained in the original fuel, whereas gas, oil, and solid fuels can in many cases yield over-all results far superior. It is regrettable that no estimate of the heat requirements of industry has yet been made; but no one with an intimate acquaintance with the subject will deny that heat, whether at high or at low temperatures, in large or small amount, and under varying requirements as to nicety of control, is just as essential to production as power. No truer statement was ever penned than that which appeared in the report of the Royal Commission on the Coal Industry (1925), which said: "It has

been strongly impressed upon us as the outcome of our inquiries that it is an error to suppose that the only, or even the principal, object to be aimed at . . . is the most economical method of producing electricity. The object to be aimed at is the most economical and efficient way of utilizing the energy embodied in the coal. The question is not the co-ordination, as is often supposed of two industries, coal and electricity, but of several—coal, electricity, gas, oil, chemical products, blast furnaces, coke ovens, &c. Two or more methods, dealing with two, three, or more of these, may be used simultaneously in combination, one feeding the other."

Probable Hindrance to Progress.

On these grounds alone I foresee much delay to progress resulting from excessive attention paid to the development of electricity and the corresponding neglect of the benefits available from an organization of the carbonizing industries, and from ordered attention to the heat and power requirements and production methods of individual industries.

The only quarrel that I have with the paragraph I have just quoted from the Report of the Royal Commission is that it states as a simple proposition a problem or series of problems which are in reality of great complexity. The question of the co-ordination of gas and coking interests for a considerable area of the industrial North of England is now being closely investigated by the Area Gas Supply Committee under the Chairmanship of Sir Alexander Walker. It would not, therefore, be right for me to express any decided views while the matter is still *sub judice*. I will content myself with setting before you as concisely as I can the salient factors affecting the carbonizing industries, and leave you to endeavour to find the solution of the problems set before you.

The Gas Industry.

We have in the case of gas an industry which has been developed during the past 117 years as a public service to supply first light, and more recently heat, in the form of gas, as well as solid smokeless fuel in the form of coke. Throughout its existence, the industry has been closely controlled by Parliament, and its special powers and privileges in regard to the sale of gas are balanced by correspondingly severe conditions imposed upon it as to quality, purity, obligation to supply, price, &c. For many years the industry has had a free field in connection with its own main products of gas and coke, though, of course, it has had to meet competition from coal, oil, and electricity. It has developed the major part of its present-day business—domestic cooking and heating, water heating, and industrial heating, whether by solid or gaseous fuel—entirely by its own efforts through the good service which it has given to its consumers.

Its Statutory Obligations.

The sale of gas is, of course, the mainstay of the industry, so that gas-works manufacturing plant has been primarily designed to yield efficient carbonizing results, and at the same time to be sufficiently flexible to respond to the variations in output between winter and summer (2 to 1) and to meet variations of 30 p.ct. from day to day. It must also be sufficiently reliable in working to maintain under statutory obligation an uninterrupted supply of gas at all times. This obligation to give a continuous supply places the gas industry in quite a different category from industries or processes where the carbonization of coal is purely a commercial proposition and the output can be varied at will.

In general, the manufacture of coal gas results in the production of coke in excess of the demand, and the gas industry has had, therefore, to regulate the supply of coke to the home market by export and by the conversion of part of the remainder into carburetted water gas.

Last year, of the 17,000 c.ft. of gas produced by authorized gas undertakings from each ton of coal carbonized, only 14,200 c.ft. was coal gas. In addition to the coal gas so produced, 13·4 cwt. of coke was manufactured, and, of this, 3·6 cwt. was used for firing retorts and for other works uses; 1·1 cwt. absorbed in the manufacture of water gas; and 1·1 cwt. exported; leaving 7·6 cwt. of coke for home disposal. In other words, a home sale of 0·45 cwt. of coke was effected for each 1000 c.ft. of gas sold.

Increasing Sales of Gas.

For many years the sales of gas have increased steadily at an average rate of 3 p.ct. per annum. This increase has brought with it the necessity for regular extensions to the manufacturing plant, and has been an important factor in enabling the industry to be in possession of plant of modern design maintained in first-class condition.

As with all carbonizing processes the operations are profitable only so long as the prices received for the products exceed the cost of raw coal by an amount sufficient to pay for the cost of conversion and to meet capital and other charges. In the gas industry, while certain of its markets are assured, the profits are definitely limited, and no exploitation of these is possible. The price at which gas can be manufactured is dependent, therefore, upon that received for the residuals, but principally for the coke. It is also of importance to recognize that this balance of receipts far outweighs any economies that can be effected by the use of large units. Therefore, in contradistinction to the principle prevailing in the generation of electricity, the size of the individual gas-works is not so much a factor in cheap production as a favourable ratio between the price of coal and the return for residuals, brought about by a works favourably situated in regard to the transport of the necessary coal, accompanied by a good demand for coke in the neighbourhood.

The Coking Industry.

The coking industry is of approximately the same age as the gas industry and treats an approximately equal amount of coal by high-temperature carbonization. In its early days the operations were conducted solely for the purpose of obtaining a hard coke for metallurgical processes and the other products of carbonization were wasted. In the past fifty years the methods adopted, however, have resulted in the recovery of ever-increasing quantities of these products. The industry has always been, and still is, purely a coal treatment industry. Originally designed for the production of one commodity—coke—it now undertakes the production of several others, including gas, but with this great distinction—that it can do this at will, whereas the gas industry is obliged by statute, as I have already stated, to give a public and continuous service of light, heat, and power. It is important to bear this point in mind, especially as the gas industry has always been controlled by Parliament with the express intention of securing the maximum benefits to the community at a minimum cost, while the coking industry, like any other chemical industry, has pursued its way unhampered by any restrictions upon its operations, profits, &c.

Unhampered by Any Restrictions.

One example of this freedom is in the location of manufacturing plant. A gas-works can only be erected and worked on authorized sites after troublesome and costly Parliamentary procedure, while colliery owners and others can erect carbonizing plants without let or hindrance and without neighbouring property owners having any special right of protest. So far no objection has been raised to the gas produced in these plants on unscheduled land being disposed of to distributing gas undertakings, but it is clear that the maintenance of this difference in the facilities granted to the two industries to manufacture gas would be inequitable. In this country the greater number of coke oven installations are the property of, and worked by or for, individual colliery owners; the plant being near the pits. While this has resulted in keeping the cost of coal at a minimum, it has involved the transport of the coke to iron and steel works or other industries, and has left the surplus gas to be disposed of locally, principally for boiler firing owing to the absence of other more remunerative applications. It will be remembered that the practice of the coking industry is to heat the ovens with a portion of the gas made, so as to secure a maximum production of coke. The surplus of gas after providing for this heating has slowly risen with improvements in manufacturing methods to between 6000 and 7500 c.ft. per ton of coal in the best plants of to-day. In addition to this quantity of gas there is produced 13·5 cwt. of coke per ton of coal.

Different Conditions Abroad.

In America and on the Continent ownership of coke ovens by the collieries is not usual, the ovens being situated for the most part at iron and steel works. Many authorities have pointed out that this leads to a maximum of heat and fuel economy and in fact to an almost self-contained plant wherein the coke is used for iron production and the coal gas for steel manufacture, while the ovens can be heated with the blast furnace gas so often wasted in this country. The close association of the coke oven plants with the iron and steel works in these countries, aided by various economic causes, has allowed the plant used for the process to be developed apace in recent years. Very large units of improved designs having low working costs and high carbonizing efficiency have been erected, and it has been found possible to produce with them a proportion of cokes suitable for purposes other than metallurgical—central heating, for example.

Until recent years the high quality of British coking coals and the low price for them at which the colliery owners were able to charge themselves were such that the coking business could be conducted at a profit based almost entirely upon the receipts for coke. Since the war, however, the depression in the coal and iron and steel trades has resulted in a severe falling-off in the demand for coke, and in a lack of means to modernize the plants so that the financial return of the plants to the owners is much reduced, while the plants themselves are overdue for replacement.

The Difficulties of the Colliery Owners.

The colliery owners are, therefore, faced with this serious situation—their old coke markets are far less remunerative than they were, and their coke plants need modernizing. Furthermore, gas, electricity, and gas coke have made inroads upon the sales of large coal. They see in the modern coke oven plant as used abroad a device to make the smaller varieties of coal as remunerative as the large, if only markets for coke, gas,

and other products can be secured and developed. Many schemes have been proposed, but few have taken into account the obligations of the gas industry, the economics of the coke markets, or the unsuitability of coke oven plant to meet fluctuating loads—to mention only a few of the considerations involved.

These schemes in their simplest form suggested the sale of the surplus gas to gas undertakings at prices more remunerative than the value received for present uses. A great deal has indeed been accomplished on these lines by mutual agreement with neighbouring gas undertakings, and last year no less than 6500 million c.ft. were so disposed of, and this quantity should be increased to 12,000 million c.ft. during the current year; and it is well worth noting that the amount of coke oven gas used for town purposes in this country exceeds that so distributed by the oft-quoted German long-distance gas scheme. The value of such gas to gas undertakings, and the guarantees necessary for the provision and maintenance of these bulk supplies, were considered in much detail and in an able manner by Mr. T. P. Ridley in his paper before the World Power Fuel Conference last year—see "Journal," Vol. 183, 659. So long as the question was confined to the disposal of gas produced in the manufacture of metallurgical coke, the problem was one comparatively easy of solution. With the production of cokes suitable for the domestic market, the proposals to erect coke oven plants at the collieries to make coke for this market, and to distribute the gas for town purposes assume an entirely different aspect.

Risk of Injustice to the Gas Consumer.

The point at issue is no longer merely whether a more remunerative outlet for surplus coke-oven gas can be found, but whether plants uncontrolled on behalf of the community by Parliament, and having advantages, such as derating, denied to the gas industry, should be erected with a view to unrestricted and unconditioned competition with that industry in the markets which it has built up.

The demand for gas, in spite of the severe competition from electricity and other fuels, steadily increases, but, though it may be possible at reduced prices to obtain a larger market in the industrial field, one would have to be unduly optimistic to assume that additional outputs of gas from coke ovens could be absorbed otherwise than by displacing the gas now made by existing gas undertakings.

The advantage to the collieries of the replacement of the sale of raw coal by its carbonization near the pithead is not the only side of the question for consideration. The disadvantages that may ensue to gas consumers in the future owing to the control of gas manufacturing costs passing to the colliery owners must receive no less serious consideration.

The effect upon the coke market—which, as I have shown, plays an important part in determining the price of gas—which would be caused by the entry of the coke oven industry into domestic gas supply may be well illustrated by considering the effect of manufacturing the aggregate gas demand of all the authorized gas undertakings for last year in coke ovens. The production of coke in the coking industry amounts to some 1·8 to 2·3 cwt. per 1000 c.ft. of surplus gas—that is, 3½ to 4½ times the production by the gas industry for a similar quantity of gas. Instead, then, of a production for sale of 7·7 million tons of coke, there would have been at least 27 million tons to have been disposed of. No words of mine are needed to point out the effect of throwing this much increased quantity of coke upon a market as yet undeveloped to receive it.

The Problem at Issue.

The whole problem is really a coke disposal problem rather than a gas problem. Without considering the markets for the residual products in which the gas and the coke oven industries might meet in competition, the complex problems which would arise as a result of the evolution of gas and coking industries upon similar lines will be appreciated. When it is further realized that they have already in common the difficulties connected with the sale of ammonia products in a field dominated to-day by the production of synthetic ammonia and of tar products in the face of a falling of tar values due to the altered conditions of the pitch and creosote markets, we shall, I am sure, not envy the Area Gas Committee their task of finding a solution satisfactory to all parties.

Low-Temperature Plants.

The recent visit of members of the Institute to low-temperature installations which have been erected on a commercial scale at several London gas-works, at a capital cost of over £250,000, will be fresh in your memories. The promise of at least some measure of success—as you will have realized from the discussion that followed this visit—for low-temperature carbonization processes, while of little influence upon the present politics either of the colliery interests or of the two great carbonizing industries, is a further factor to which consideration must be given in trying to solve the problems of the joint working of the carbonizing industries. Low-temperature plants will have various bye-products for disposal—gas, often of a high calorific value; tar and ammonia; and last, but not least, low-temperature cokes (not, however, I think, in competition with other cokes so much as with that enormous tonnage of coal now burnt in the raw state in the domestic grate).

Smoke Abatement.

Idealists have often pictured this country with the whole of the 40 million tons so consumed annually replaced by smokeless fuels, solid and gaseous, aided by electricity. I have not yet seen any estimate of the effect which so great a change in our national habits of coal using would have upon the price of coal to the coal treating industries. Be that as it may, it is unquestionable that there is much scope for the improvement of the conditions under which fuel is burnt in our homes and by our small industries, and I should like to say a few words here upon two subjects, clean coal and clean air.

Upon the first I have many times expressed myself strongly, in particular as regards the coal supplied to the gas industry. Recently I have been able to record an improvement in the ash content of coal delivered, and I feel justified in attributing this to increased care at the pits and to the extension of the practice of coal cleaning, which I see has now been extended to over 25 p.ct. of the total of all British coal mined. I do not think that we can yet rest upon our oars in this respect, as with better understanding of the art of fuel utilization the practice of buying coal upon performance, if not by definite analysis, is one which is increasing. Whether the intention is to burn coal in one stage for the generation of electricity or power, or to carbonize it and burn or gasify the coke, the resulting ash is a bugbear which causes difficulties all along the line, from the commencement of its transport, through all the operations which it undergoes, up to its final disposal in the form of clinker or other residue. In the case of pulverized fuel firing, the ash may, and often does, contribute its quota to air pollution.

Importance of Coal Cleaning.

In these days it is unnecessary to quote chapter and verse to prove the advantages of coal cleaning, and most enlightened buyers will willingly pay such extra charge for cleaned coal as will amply repay the cost of treatment. It has been suggested that large coal users should instal their own coal cleaning plants; but, apart from the loss due to the transport cost of removable foreign matter to their premises, they are faced with the difficulty of the disposal of dross, which does not present itself so acutely at the pithead.

The processes for cleaning, both wet and dry, appear year by year to be approaching certainty of operation, to result in less loss of coal substance in the refuse, and to entail less preliminary sizing of the coal, with a consequent reduction in the size and maintenance costs of the apparatus.

Already much of the coal carbonized by the colliery owners themselves in their coking plants is cleaned to a minimum of ash, so as to produce a high-quality coke; and it should be possible for this benefit to be applied to all coal needed for carbonization by any system, and in most instances for coal intended for direct combustion.

The proposals for the erection of a large electrical generating station in London have recently drawn public attention to the wider aspects of air pollution which results from the combustion of fuel. The subject of smoke abatement is a well-worn one among fuel economists; and though I am afraid the public conscience is not yet very sensitive to the beneficial effects of the extra sunlight secured by the abolition of the smoke pall in large towns, or to the effects already wrought by gas and electricity undertakings and conscientious users of industrial fuel who have already done much good work, yet I do feel that the introduction of high-quality smokeless fuels for use in the flaming and smoking domestic coal fire will tend to create a greater appreciation of the benefits of, and a stronger desire for, a purer atmosphere.

In the direct burning of fuel, control of combustion by industrial users and the adoption of smokeless fuels by domestic users will do much to free the atmosphere from smoke. I have previously referred to a difficulty—the emission of dust from pulverized fuel burners—which is now of almost as much importance, but this is one which should be curable by the adoption of high-tension electrical precipitation apparatus.

Air Pollution by Centralized Works.

The last difficulty—pollution by non-visible gases such as sulphur dioxide—does not seem so easy of solution. Alarming figures as to the production of sulphuric acid in the case I have referred to were brought forward, but the writers do not seem to appreciate that the sulphur freed in the combustion of coal for the production of electricity, which would return about 20 p.ct. of the original heat energy of the coal at the consumers' apparatus, would be exactly the same as the amount that would have been released in the aggregate from many hundreds of domestic chimneys had the coal been burnt to provide heat, the normal efficiency of the open coal fire being also 20 p.ct.

In the case of the various carbonizing processes, at least one-third of the sulphur in the coal treated is definitely removed in the process of manufacture, and so does not re-appear in the combustion of the products. It has been proposed to wash the power station flue gases to remove the sulphur; and the cost of

so doing and the prospects of commercial success will be watched with great interest.

The policy of the concentration of the generation and utilization of energy in whatever form it is carried out inevitably results in difficulties from air pollution, from noise, and from other forms of unnatural disturbances which become more prominent because of their concentration. It is a phase, unpleasant perhaps, in the development of civilization which has to be acknowledged, and the effects of which will be conquered as soon as the major operations have really settled down into regular working order. In the meantime, while always keeping the ideal before us, we must not allow progress which benefits the whole community to be unduly hindered by sympathy with a small minority. Exhaust fumes, noise, and street accidents are part of the price of the development of universal motor transport.

The Threat to the Countryside.

Cheap hydro-electric power can only be secured at the expense of the beauty of the countryside, and, in fact, instances are not wanting in every branch of industrial progress of violence done to the æsthetic feelings of some portion of the community. At the same time, while recognizing that where genuine benefits are secured to large numbers of the community, there is always a possibility of collateral disadvantage being caused to the minority, we must not allow the principle to be extended too far and used as a pretext for inflicting damage and disturbance in the name of, rather than in the cause of, progress. Unfortunate instances of this will no doubt occur to you. I may quote for example recent attempts which would have the effect, in many unprejudiced persons' minds, of spoiling the beauty of the Highlands by the promotion of hydro-electric schemes which on the promoters' own showing offered no advantage to the consumers over fuel-fired stations more conveniently situated.

Imported *v.* Home Produced Fuel.

I have not in these remarks referred in much detail to the use of the various forms of oil fuel. Each of the regrettable disputes in the coal industry appears to have resulted in a certain extension of their use. It is not good that one of the chief coal producing nations should find itself compelled to burn imported fuels for purposes for which gas, electricity, and pulverized coal can all be used equally successfully.

The cases of the Navy and motor traction are different, and it is to be hoped that increased treatment of coal by carbonization and hydrogenation will to some extent provide home produced liquid fuels to satisfy their needs, and exercise a beneficial influence upon the markets. In this connection the development of a motor vehicle engine designed to use heavy oils is of the greatest interest and likely in the near future to take its place as the most outstanding advance in fuel utilization of recent years.

In surveying the field of fuel utilization over the past quarter of a century, one is much struck by the change in outlook. Coal is no longer a single simple substance to be sold by the name of a seam and turned into power by means of simple boilers and engines, or into heat by combustion in crude grates, or into its products in simple heated chambers by rule-of-thumb methods.

It is now recognized as the general name for a series of fuels having vastly different properties, and its use in the raw state is becoming more and more restricted, as years pass, in favour of its conversion into other products and other forms of energy by the labour of trained minds and the use of highly developed plant.

In the gas and coking industries simple treatment has given way to a complex series of processes, to low-temperature treatments, to hydrogenation, and to thermally efficient conversion to electricity, while many of the resulting chemical products are themselves converted by further processes into other synthetic products.

At every stage from the winning of the coal to the final consumption of its contained energy, a mechanization and processing is introduced at all stages in order to eliminate wherever possible severe manual labour and to substitute mental effort.

More Co-Ordination Required.

Concurrently with this development, technical knowledge is now required from the worker in the factory and the wife in the home, as well as from the research worker and the administrator. There is a further need for the co-ordination of information and the spread of knowledge in different industries and for improved liaison between allied industries to avoid duplication of effort and waste of energy.

At the last World Power Conference information was given which compared the different nations' efforts in this respect. While the amount and quality of the work done by our own organizations was by no means negligible, Germany, both in co-ordination within each industry through Heat Economy Bureaux, and the association of collieries with other industries, is much further advanced.

In the first report of the National Fuel and Power Committee, a compliment was paid to this Institute in the following words:

> More recently a separate organization, the Institute of Fuel, has been formed, and we are glad to see that the support given to it shows that it is now appreciated that there are many problems connected with fuel which are separate from those which are peculiar to the particular industries in which it is used, and that fuel technology has become a definite branch of applied science requiring a comprehensive organization of this kind of its own. We hope that this new body will be successful in bringing together the knowledge and experience of fuel questions that have previously been scattered among so many different institutions, societies, and associations.

The Work and Future of the Institute.

Young as our Institute is in years, it has already enriched its transactions with a number of excellent papers and addresses; and it gives me the greatest pleasure to announce that the Council have decided to offer a medal annually for the best paper submitted by a Student Member, in order to encourage our younger members to follow and maintain our high standard.

I am, however, not so certain that our Institute has yet made a sufficiently definite move in the direction of realizing the hope expressed by the members of the National Fuel and Power Committee to secure to us the unique position as the principal promoters of fuel economy for the benefit alike of industry and the community at large.

The necessary organization can be studied in detail in the activities of the German "Warmstelle." I am convinced that if the members of this Institute would realize a little more fully the urgent need for co-ordination of effort and for free and full exchange of information on technical, commercial, and economic fuel questions, the development of the Institute into a national body of the highest importance would quickly be assured.

INSTITUTE OF FUEL DINNER.

A Distinguished Gathering.

The Third Annual Dinner of the Institute of Fuel took place on Thursday last, at the Connaught Rooms, Great Queen Street, W.C.—Sir David Milne-Watson, LL.D., D.L. (the President), in the Chair. Among those for whom seats had been reserved at the top table were the Right Hon. J. H. Thomas, P.C., M.P. (Lord Privy Seal), the Right Hon. Lord Melchett, P.C., LL.D., F.R.S. (Founder President), Mr. Carl J. Jefferson (Head of the Fuel Conservation Section of the United States Shipping Board), Sir Henry Fowler, K.B.E. (Vice-President), Mr. C. S. Shapley (President of the Institution of Gas Engineers), Sir Arthur Duckham, G.B.E., K.C.B., Mr. Thomas Hardie (Chief Engineer of the Gas Light and Coke Company), Mr. R. W. Foot (General Manager of the Gas Light and Coke Company), Mr. John Terrace (Member of Council), Dr. A. E. Dunstan (President of the Institution of Petroleum Technologists), Prof. M. W. Travers, D.Sc., F.R.S. (Member of Council), Mr. J. A. Reavell (President of the Institution of Chemical Engineers), Sir Philip Dawson, M.P. (Member of Council), Dr. F. E. Smith, C.B., C.B.E., F.R.S. (Secretary to the Department of Industrial and Scientific Research), Sir William J. Larke, K.B.E. (Vice-President), Dr. C. H. Lander (Director of Fuel Research), and Mr. T. Westthorp (Hon. Secretary of the Coke Oven Managers' Association). There were a large number of ladies present; and on the conclusion of the speeches, the Grand Hall was cleared for dancing.

The Institute.

Mr. J. H. Thomas, who proposed the toast of "The Institute of Fuel," remarked that this was a new organization, and he wondered why it had taken so long to bring into being a body so essential to the country. All engaged in the fuel industry realized that there must be a pooling of brains and ideas, and that they must adapt themselves to modern conditions and circumstances. To-day they found themselves face to face with the high standard of living that experience and time had developed; and, on the other hand, they saw that every year £800,000,000 had to be provided to purchase from people outside this country things that were essential to the life of the nation. Those things had to be paid for in gold or in kind. Gold was ruled out, and so they must pay in kind. Speaking as a Labour leader and as a member of the Government, with a full sense of responsibility, he wished to say that in the great struggle that was now going on it was no good running away from facts. The nation could only continue to prosper, or even hold its own, if it concentrated on being able not only to pay for

everything it bought, but to have a little surplus as well. That was why the export trade of the country was vital, and why the fuel industry must realize that in the great struggle of the future brains had to be mobilized. The fuel industry was the key to all industries. Whatever might have been the slipshod methods of the past, brains, co-operation, and organization must be the dominant notes of the future. This was why he welcomed the Institute, and why he believed it could perform useful work. He was delighted to propose this toast, and to couple with it the name of the President, who had done so much for the success of the industry.

An Appeal for a Home.

The President, responding, expressed his gratification at the remarks of Mr. Thomas, and added that it was absolutely essential, if this great country of ours was to prosper, that the fuel industry should come to the top once more. They in the fuel industry had since the war been labouring under great disadvantages; and the solution of these difficulties was not a simple matter. It was of no use to make one section of the community prosperous at the expense of another. He had no objection to coal marketing schemes that could cut out waste in selling; but any advancing of prices in the coal industry was not going to solve the great problems of this country. Cheap coal was absolutely essential, in order that there might be cheap iron and steel. It was an honour to have with them Mr. Carl Jefferson, who had come all the way from America as a delegate to the conference. Mr. Jefferson was the head of the Fuel Conservation Section of the United States Shipping Board, and had come to tell them of the work that had been done by his Government in the development of pulverized fuel firing under marine boilers. It was gratifying to feel that in this way something was being done to consolidate the friendship between the United States and this country.

Proceeding, the President made an earnest appeal to all present who were in any way able to do so to support the proposal that a home should be provided for the Institute. The feeling was, he said, that if they could secure premises in which to conduct their business the Institute could render greater service to the fuel industry, and therefore to the country. It was a very young organization; but he was delighted to be able to report that it was growing rapidly in numbers. There were now no less than 750 members; and it would be gratifying to his audience to learn that at this function the attendance was 50 p.ct. greater than was the case a year ago. In conclusion, while not in any way jealous of hydro-electricity, he would ask those present not to forget that in this country black coal was far more important than any "white" coal. While there remained such ample supplies of black coal, he did feel they ought to hesitate before spoiling some of the most beautiful country in the world—namely, in Scotland—by the erection of dams and other things necessary for a hydro-electricity supply.

Oil from Coal.

Lord Melchett, who submitted the toast of "The Visitors," declared that the continued success of the Institute was very near to his heart. If something could be done to solve the mining difficulties, all those concerned for the future of this country would be very much relieved. Great efforts were being made in the direction of extracting oil from coal; and he hoped that at a not too far distant time they would be commercially successful. The effect of this upon the prosperity of the country would be enormous. Already they had been running motor-cars on petrol made from Durham slack. The quality was excellent. Technically the problem was capable of solution; but the economics were very difficult. He was, however, more hopeful than he had been in the past. Many industries depended upon the better utilization of coal; and an Institute such as theirs could render very great service.

The toast was acknowledged by Mr. Carl J. Jefferson and Dr. A. E. Dunstan.

The President.

Sir Henry Fowler, asking all present to drink to the health of the President, said that they owed Sir David Milne-Watson a deep debt of gratitude, not only for the interest which he took in the Institute, but for the work which he was doing day by day towards making this a better world to live in. He was doing away with smoke. In the experimental work he was carrying out in connection with low-temperature carbonization, one appreciated the breadth and length of vision which were coupled with his business capacity.

The President, responding, remarked that he esteemed it one of the greatest honours of his life to have been chosen as President of the Institute of Fuel. His period of office had been one in which they had witnessed increased numbers and increased prosperity. At a recent Council meeting it had been decided to present a medal annually for the best paper presented by a student. This proved their desire to encourage young men to join up and present papers. They wished the students to join in as large numbers as possible, and promised to do all they could to assist them.

ECONOMICS OF COKE OVEN GAS UTILIZATION IN INDUSTRY.

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[From a Paper before the Institute of Fuel.]

The consideration now being given by the Area Gas Supply Committee to the possibilities of large scale use of coke oven gas in this country, together with the developments in Germany of long-distance transmission of coke oven gas, renders necessary a critical consideration of the economic possibilities of such a scheme, or series of schemes, in Great Britain.

The total quantity of coal carbonized in bye-product coke ovens in this country in 1928 is given in Table I.*

Table I.

District.	Quantity of Coal Carbonized.	Quantity of Coke Obtained.
	Tons.	Tons.
North-East Coast (including Durham and North Riding of Yorkshire)	6,267,289	4,394,155
Cumberland	658,845	454,712
Lancashire, Cheshire, and North Wales	651,369	412,966
Yorkshire, Lincolnshire, and Derbyshire	5,873,392	3,989,085
Staffs., Salop, and Warwick	556,679	325,685
S. Wales and Monmouth	1,796,248	1,196,527
Scotland	576,833	423,311
Great Britain	16,380,655	11,196,441
Corresponding figures for 1927	16,252,955	11,110,035

Note.—Of the coal carbonized at bye-product ovens, 6,305,326 tons were consumed at 3181 waste-heat ovens and 9,157,300 tons at 3830 regenerative ovens. Separate particulars are not available of the coal carbonized at the remaining bye-product ovens, which comprised 304 waste-heat and 119 regenerative ovens.

The quantity of coke oven gas that is available is difficult to estimate. T. P. Ridley† basing his calculations on the assumption that 1000 c.ft. of gas were available for purposes other than heating the ovens per ton of coal carbonized in waste-heat ovens and 6000 c.ft. of gas from regenerative ovens, calculated that in 1925 there was an annual surplus of 54 thousand million c.ft., of which 5340 million c.ft. were purchased by gas undertakings. The quantity of gas purchased from coke ovens by authorized gas undertakings for the year 1928 is given by the Board of Trade‡ as 6560 million c.ft.

The surplus coke oven gas available for purposes other than for heating the ovens would be increased if existing coking plants were replaced by modern ovens. Modern ovens, built of silica bricks and operating at optimum temperatures, give approximately 11,000 c.ft. of gas per ton of dry coal, of which 4500 c.ft., or its equivalent, would be used in heating ovens, leaving over 6000 c.ft. per ton of coal carbonized available for other purposes. Taking a figure of 6000 c.ft. per ton surplus and assuming that the coal carbonized was 16 million tons per annum, this would leave an available surplus of nearly 100 thousand million c.ft. per annum—equal to over one-third of the present town gas consumption in this country.

It is generally considered that the older coking plants in this country, consisting of comparatively small batteries of coke ovens, carbonizing an average of less than 300 tons of coal per day in small ovens, with an average capacity of the order of 5½ tons per oven per day, will have to be rebuilt in the near future, probably under conditions which would allow of a much greater capacity per oven and battery than is the case at present; and it is therefore desirable to consider the problems of disposal of coke oven gas, assuming that the future production will be about 100 thousand million c.ft. per annum.

Some guidance can be obtained from American experience.

* Report of Secretary of Mines, 1928. (H.M. Stationery Office.)

† Transactions Fuel Conference, World Power Conference, 1928.

‡ Gas Undertakings in Great Britain, 1928. (H.M. Stationery Office.)

Particulars of the production and disposal of coke oven gas in the U.S.A. was given at the Fuel Conference,* and is summarized in Table II.

Table II.—*Quantity of Coke Oven Gas Produced and Disposed in U.S.A in 1928.*

	Thousands of C.Ft.
Used under boilers	25,953,876
Used in steel works	249,840,649
Distributed in city mains	89,565,953
Sold for industrial use	32,553,610
Used at coking plants and wasted	308,767,740
Total	706,681,828

Average price as distributed from city mains, $0.335 per 1000.
Average price of industrial gas, $0.163 per 1000.

Conditions are not the same in the U.S.A. as they are in Great Britain, because the gas industry *per se* is relatively small, the quantity of coal carbonized and converted into water gas per annum being approximately 5½ million tons compared with about 69 million tons carbonized in coke ovens.†

J. K. Dickie, in a recent paper,‡ finds it "difficult to understand why offers of 6d. to 7d. should be made by gas authorities—a price which can hardly be considered reasonable in the light of . . . manufacturing costs." This question may at first sight seem reasonable in view of the fact that 11d. per 1000 c.ft. is paid by the Glasgow Corporation for purified coke oven gas from the Auchengeich coke ovens.

The question arises, however, whether the potential demand for gas in the various coke-producing areas is such as would justify a price of this order, bearing in mind the highly-organized position of the gas industry on the one hand and the demand of industry for cheap fuel on the other. It is not a question of increasing the gas consumption over the whole country by 33 p.ct., but of increasing demand for domestic and industrial purposes in certain limited areas.

The question is a complicated one, and though the Area Gas Committee have been considering the problems involved in one area between the Humber and Liverpool and between Leeds and Birmingham, for several months, no final and definite solution can yet have been reached.

The necessity for a re-organization of the coking industry and the consequent benefit to the iron and steel industry is clearly understood, and such re-organization would be rapidly accelerated if a reasonable price could be obtained for the coke oven gas that would be rendered available, if existing coking plant were replaced by modern ovens. The principal question is, What is the price which industry could afford to pay for the gas?

The chief uses of coke oven gas, apart from the limited amounts sold to gas undertakings, are: (1) For steam raising; (2) to a limited extent for power production in gas engines; (3) for metallurgical furnaces in the iron and steel industry.

1. *Coke Oven Gas for Steam Raising.*

This is the principal use of coke oven gas at present. Its value as a boiler fuel is determined by the cost of coal, as, while gas firing offers certain obvious advantages over coal firing, the thermal efficiency of gas-fired boilers is not very much greater than that of the best modern coal-fired boilers.

In the case of coking plants located near the collieries, coal for steam raising is available at a price of the order at the present time of 10s. per ton. If we allow 300 therms per ton of coal and add (say) 2s. 6d. per ton for cost of handling coal and clinker made, this brings the cost of fuel to a figure of ¼d. per therm, which represents approximately the value of coke oven gas for steam-raising purposes under these conditions.

2. *Coke Oven Gas for Power Production in Gas Engines.*

Somewhat similar considerations apply to the use of gas in gas engines. While disabilities have arisen in the past in using coke oven gas for this purpose in large gas engines, these have been overcome, at any rate in the case of small engines of 500 to 1000 H.P., and, with a high load factor, cost of power generation can, under suitable conditions, be comparatively low. C. P. Finn and R. Ray§ gave figures of cost of 0·332d. and 0·166d. per Board of Trade unit based on cost of gas at 3½d. per 1000 c.ft. (0·7d. per therm), a figure which again seems low compared with the intrinsic value of coke oven gas for other purposes.

3. *Coke Oven Gas for Metallurgical Furnaces.*

The actual assessed value of coke oven gas in the cost sheets of iron and steel producers varies considerably, but, in view of the qualities of the gas, its intrinsic value seems to be considerably higher than the value based purely on its thermal content. The cost of fuel in industrial use should take into consideration not only the actual cost per heat unit, but the sum total of all the costs involved in its utilization as compared with those when other fuels are used.

In this respect a number of factors have to be taken into consideration, which can be summarized as follows: (1) Cost of fuel at works; (2) cost of transport of fuel inside the works; (3) cost of labour in utilization; (4) cost of disposal of refuse; (5) character of fuel, particularly its uniformity of composition; (6) efficiency of utilization; (7) ease of control and character of furnace atmosphere; (8) effect of fuel character on yield of product; (9) ancillary cost—*e.g.*, repairs, maintenance, capital charges, &c., on the fuel-using plant; and (10) influence of fuel character on such questions as smoke prevention, cleanliness of works, and so on.

It is difficult to assess generally the actual value of all these factors, as circumstances differ so much in individual industries and at individual works, but an attempt can be made to determine in a general way the value of coke oven gas in the various districts in which it is manufactured in this country, with a view to considering the effects both on the coking industries and those which are potential consumers.

Bearing in mind the limitations already discussed in connection with the use of gas for power production, the obvious potential markets for gas would appear to be classes: (6) iron and steel works, (8) domestic fuel, and (9) general manufactures.

It is not within the province of this paper to deal with the domestic market, as the problems of distribution to the domestic consumer come essentially within the province of the gas and not the coke oven industry. This applies also to the smaller industrial consumers in the engineering, motor-car, glass, non-ferrous metals, and other industries. The convenience of gas firing in such cases is frequently such as allows of its use in comparatively small units at a fairly high price per therm. Possibly, in such cases, the principal competitor would be oil, which is at present available at a price of 2½d. per therm upwards, so that gas would have to be sold to such consumers at a figure of the same order, even though it possesses several technical advantages not possessed by oil and its price does not fluctuate to the same extent.

There is not sufficient information to allow of complete investigation of the possibilities of increase of demand by the small user, though the experience of such centres as Sheffield, Newcastle, Birmingham, and other areas, has shown that price reduction stimulates demand to an extent which allows of considerable increase over previous production.

Coke Oven Gas in the Iron and Steel Industry.

The largest potential consumer, however, is the iron and steel industry, where coke oven gas offers special advantages in furnace work. The cost, however, to the industry, owing to the quantity of fuel used and the high proportion that fuel cost bears to other charges, must bear a much closer relationship to the cost of competitive fuels than would be the case in industrial operations, where fuel cost is small compared with other costs, and where the value of the resulting product is high compared with the value of the fuel required. The fuels at present used in iron and steel practice are: (1) Blast-furnace gas; (2) producer gas; (3) raw coal; (4) fuel oil.

Blast-furnace gas is only available in certain cases, while it has definite limitations, owing to its low calorific value. It cannot, for example, be used in open-hearth furnaces, and while it is used successfully in gas-fired soakers and re-heating furnaces, gas and air regeneration is necessary with consequent higher capital costs of furnace equipment. Further, since its calorific value is only one-fifth that of coke oven gas, the volume that has to be carried to meet the thermal requirements of any consuming unit is five times as great, so that costs of transmission do not allow of its use at more than moderate distances from the blast furnaces.

Oil has the advantage of high flame intensity and of flexibility of use, and is largely used, particularly in the United States, for metallurgical operations, but in this country its comparatively high price and, particularly, price fluctuations have militated against its general adoption, though it is being increasingly used for specialized work and in comparatively small units.

The principal competitors of coke oven gas, therefore, would be coal or producer gas. Coal-fired furnaces are largely used, particularly in the manufacture of forgings, sheets, tinplates, and other specialized iron and steel products. These furnaces have certain advantages; they are cheap to construct, easy to use, and can be operated to give furnace atmospheres which allow of reduction to a minimum of oxidation losses of the product during the process of heating. They suffer, however, from the disadvantages that they are wasteful in fuel and are liable to smoke heavily, a factor of increasing importance in our industrial towns in view of the passage of the Smoke Abatement Act of 1926. The coal used in such furnaces is frequently expensive (about 18s. per ton), and, if transport of coal and clinker inside the works is taken into consideration, the cost of the coal to furnaces is frequently of the order of 1d. per therm. At the same time, coal-fired furnaces operate at such low efficiencies that the total cost of fuel is much greater than would be represented simply by the intrinsic cost of the coal used. The principal difficulty with coal-fired furnaces is to maintain such

* Industrial Gas in the United States, American Gas Engineers, Trans. Fuel Conference, World Power Conference, 1928.

† F. G. Tryon and H. O. Rogers. Trans. International Conference Bituminous Coal, Pittsburgh, 1928.

‡ "Gas Journal," Vol. 187, p. 617.

§ Trans. Fuel Conference, 1928; World Power Conference.

a continuity of firing as would allow of efficient combustion control and thus increase efficiency, while at the same time maintaining the necessary furnace atmosphere without the production of smoke. Attempts have been more or less successfully made by the use of automatic stokers, to maintain a more uniform coal feed to furnaces of this type, and this allows of a greater control of combustion conditions than is possible when hand firing is used.

Improvements in furnace design, which allow of the effective admission of secondary air, also assist in this direction, and such a system in conjunction with automatic stoking, allows frequently of the use of a cheaper fuel than is the case with simple coal-fired furnaces. A further development in the use of raw coal is in the application of pulverized fuel to metallurgical practice, which has been successful in many cases.

Recent developments, therefore, are opening up possibilities of considerable improvement in the use of raw coal in industrial furnace operation and are tending to reduce the margin that can be paid per therm for coke oven gas over that for raw coal.

On the other hand, all the technical improvements required to increase the uniformity of coal-firing necessitate an increase in the capital cost of plant, and there still remains the problem of transport of coal and clinker.

While every case has to be considered on its own merits, the writer is of opinion that if coke oven gas were available at a price of the order of 1½d. per therm, the advantages of flexibility, ease of control, greater efficiency in the furnace, and so on, are such as would allow of its use in place of coal in a large number of metallurgical operations.

Producer Gas-fired Furnaces.

Producer gas costs vary considerably, depending, apart from cost of coal, on the character and size of plant and degree of continuity of operation. In modern first-class practice, using a gas machine operated for 144 hours per week and using a good coal, producer gas costs at a British works have been quoted as low as 1·14d. per therm, but the cost rapidly rises as the hours worked per week decrease. A figure of 1·5d. per therm is probably more representative of good practice, while the older plants, especially if they are not in continuous operation may show a cost per therm up to 2½d. The advantage of producer gas in furnace practice is that, if operated under suitable conditions, giving a gas of constant quality and pressure, it allows of more efficient combustion control than coal firing. In practice, however, producer gas is frequently not absolutely uniform in composition. The calorific value, CO_2 content, and so on, differ to some extent according to the coal used and according to methods of operation in the producer, particularly as the tendency, where a large number of coals are used, is for the producer-operator to adjust his conditions, particularly of saturation temperatures, to meet the requirements of the poorest coals that have to be treated. Producer gas is not economical where furnace operation is intermittent, while a further disadvantage is that the gas mains have to be burnt out periodically.

Coke oven gas offers, *prima facie*, many important advantages, particularly in the uniformity of composition which allows of accurate combustion control, and in recent practice of automatic control even in open-hearth furnaces. Its high flame intensity allows of its use without gas regeneration, and, consequently, allows of simplification of furnace design and of less space required per furnace. It is being used successfully either alone or in admixture with blast furnace gas, tar, and other fuels for practically all purposes for which producer gas is used, including soaking pits, continuous and intermittent reheating furnaces, open-hearth furnaces, annealing and heat-treating furnaces, and so on.

Probably the greatest difficulty in the use of coke oven gas in the past has been in open-hearth furnace operation, as it is not so easy to judge by visual observation of the flame the condition of the furnace, and difficulties have been experienced by workers who are not accustomed to it. These difficulties, however, have been overcome either by introducing a proportion of tar with the gas, thus increasing the flame luminosity, or by chemical control of combustion. On the Continent, open-hearth furnaces are frequently fired with a mixture of blast furnace and coke oven gas, consisting approximately of one-third by volume of coke oven gas and two-thirds blast furnace gas, having a calorific value of about 240 B.Th.U. per c.ft. In such cases gas and air regeneration is used. In American practice coke oven gas is frequently used alone for open-hearth furnaces using water-cooled burners and without regeneration of gas.

The value of coke oven gas to iron and steel works varies in different districts depending on a number of factors, among which are: (1) Quantity of blast furnace gas available depending on coke consumption per ton of pig-iron and the output; (2) relative proportions of pig-iron and steel made; (3) character of steel-making processes used, whether open hearth or bessemer; (4) character of finished steel products; and (5) cost of alternative fuel is available.

North-East Coast.

The total coke made in bye-product ovens in this area in 1927 was 1,232,424 tons. The coke consumed for pig-iron produced by firms coming within the purview of the National Federation of Iron and Steel Manufacturers was 2,594,093 tons, of which 2,206,436 tons were made at coking plants adjacent to the steel works or at collieries owned or controlled by iron and steel producers, 387,658 tons being purchased from independent coking plants.

Assuming that the coke was made in modern coking ovens, giving a surplus of 6000 c.ft. of gas per ton of coal, (say) 9000 c.ft. per ton of coke, there would be a potential supply per annum in this area of the order of 38 thousand million c.ft., (say) 190 million therms.

The steel production in 1927 amounted to 2,236,200 tons of ingots, and the quantity of finished and semi-finished steel despatched to 1,921,100 tons, with a total coal consumption of 1,427,000 tons.

If we assume that the whole of this coal were substituted by coke oven gas, allowing 300 therms per ton of coal, the potential demand for gas would be over 300 million therms per annum, a figure considerably in excess of the potential production. This figure, however, is much too high, as a considerable proportion of the coal is used for purposes such as boiler fuel, locomotives and cranes, calcining of ore, &c., for which coke oven gas is unsuitable or uneconomical. While coke oven gas is still largely used for boiler fuel in this area, the future tendency will probably be to use it as far as possible for open-hearth and general furnace practice. The quantities required for this purpose will depend, to a great extent, on the quantity of blast furnace gas available. The average coke consumption in the area in 1927 was approximately 22·5 cwt. per ton of pig-iron.

Allowing, roughly, 150,000 c.ft. of blast furnace gas per ton of coke, and assuming that the blast furnaces absorbed for stoves, blowing engines, and auxiliary plant 40 p.ct. of this, the blast furnace gas available per ton of pig-iron for use in the steel works and rolling mills amounts to about 100,000 c.ft., or nearly 230 million therms per annum.

The fuel and energy required in iron and steel works, using the open-hearth process, but leaving out the fuel requirements of the open-hearth furnaces, is of the order of 60 therms per ton of finished steel,* assuming that the best modern plants were available and that standard products were made—*e.g.*, plates, sections, and so on. Blast furnace gas required for this purpose would be some 120 million therms per annum, leaving a surplus available for admixture with coke oven gas of a little over 100 million therms.

The fuel requirements in the open-hearth furnaces can be met by the consumption of 50 therms per ton ingots, and assuming that a mixture of one-third coke oven gas by volume and two-thirds blast furnace gas, this would necessitate 33·3 therms of coke oven gas per ton of ingots, so that the minimum requirements of the open-hearth furnaces on the North-East Coast could be met by a consumption of 75 million therms coke oven gas per annum. If coke oven gas alone were used in open-hearth furnaces, consumption would be 50 therms per ton of ingots, or about 110 million therms per annum, a figure which would be equivalent to the coke oven gas available if all the coke now made by iron and steel manufacturers in this area were produced in modern coking plants and the gas made available for use in steel works. The value of this gas would be about 1·2d. to 1·5d. per therm, depending on the cost of producer gas, but the figure would not allow of transmission over any considerable distance. The potential requirements of coke oven gas in iron and steel practice are such as to justify the policy of iron and steel producers to concentrate coking plants in such districts as Tees-side; but possibly legislation would be necessary to secure wayleaves allowing of transmission of coke oven gas to the various works.

Under present conditions, the works could absorb a greater quantity of coke oven gas than that specified above, and some of the coke now made for export to other districts and abroad might therefore be made on Tees-side; but the extent to which this policy can be adopted would be determined by the cost of transport of coal from the collieries to this portion of the district; and the position would need to be analyzed in individual cases with a knowledge of all the conditions involved.

There remains the coke oven gas now made on independent coking plants located largely at the present time at the collieries. There are potential markets for gas in such areas as Newcastle and Tees-side for domestic and industrial supply, and schemes are already in being for the supply of coke oven gas to such areas, Middlesbrough, Redcar, and Newcastle being examples.

It is difficult with the information at present available to ascertain the additional quantity of gas that could be absorbed. Such industries as the shipbuilding and engineering industries can take much greater quantities than is the case at present, and this market is being rapidly developed, but the data available are insufficient to allow of calculation of the potential demand.

Taking a broad view of the position, economic prospects of an extensive gas network scheme on the North-East Coast do not appear to be too favourable, and the logical process of development would seem to be along the lines that are already taking place in concentration of coking plants either in steel-

* "Fuel Economy Review," 1927.

producing areas or at a limited number of centres near the sea ports.

West Coast.

The coke production on the West Coast in 1928 was 454,714 tons, and in 1927 512,478 tons. Pig-iron production in 1927 was 878,100 tons, and, as the average coke consumption is about 22·8 cwt. per ton of pig-iron, a considerable proportion of the coke used has to be imported from other districts. The steel ingot production in 1927 was 247,200 tons, but of this about 50 p.ct. was made by the bessemer process, in which, under optimum conditions, the blast furnace gas is sufficient to meet the heat and power requirements of the mills.

Steel works, using the open-hearth process, could absorb about 10 million therms in the form of coke oven gas per annum, as compared with a potential supply from modern coke ovens of between 20 and 25 million therms. Coking plants, however, are located in the mining area around Whitehaven, a distance of between 40 and 50 miles from steel works using the open-hearth process, and costs of transmission would be such as would not allow of this gas to be used in competition with producer coal. While there is a limited market for domestic and some industrial fuel gas in the Cumberland area, this could only absorb a very small proportion of the coke oven gas available, and as there are few industries, apart from mining and iron and steel, coke oven gas would have an intrinsic value, probably of the same order as that of coal, unless it were used for such purposes as synthetic ammonia production, using the hydrogen from the gas as a basis.

South Wales.

Coke production in South Wales is of the order of 1,200,000 tons per annum. Pig-iron production (1927) was 739,100 tons, and steel production 1,927,300 tons. The coke works are located chiefly in the eastern portion of the coalfield, where a big proportion of the steel produced is made by the bessemer process. A certain proportion of open-hearth steel is made in this portion of the area, which could take some of the coke oven gas produced, but as the other principal industry is mining, the available market is only a comparatively small domestic one, which is already served to a considerable extent by coke oven gas. In the Western portion of the area a great potential market exists in the steel and tinplate industry, the extent of which can be gathered from the fact that nearly 70 p.ct. of the steel production is made at works not associated with blast furnaces.

Some of the coals in this portion of the field make an excellent coke, and, if coking plants were available, there would seem to be considerable potentialities of coke oven gas utilization on quite an extensive scale. Steel and tinplate works, however, are scattered in many cases, and, owing to the geographical conditions involved, the problems in any extensive gas distribution scheme would be difficult to overcome, and local conditions would have to be investigated in every case. If coke oven gas were available in this portion of the area, particularly in the vicinity of a sheet and tinplate works, a ready market should be available, provided the price were round about 1½d. per therm.

Scotland.

While over 600,000 tons of pig-iron were made in Scotland in 1927, less than 300,000 tons of coke were used, as raw coal is the principal fuel used for smelting.

This quantity of coke is too small to necessitate consideration of any comprehensive scheme of gas distribution, and possibilities of expansion depend largely on the possibilities of extending the range of Scottish coking coal. These are for the most part of low-coking index, and investigations are at present in progress to determine whether suitable technical methods can be evolved to allow of their use in coke manufacture. There is a big potential market for coke oven gas for the iron and steel, shipbuilding, and engineering industries of the Clyde, and, in this area, conditions are such as should allow of a price of gas somewhat higher than that obtainable in other parts of the country.

Midland Area.

This area, which is under consideration by the Area Gas Supply Committee, extending from the Humber to Liverpool and from Leeds to Birmingham, includes the following iron and steel producing centres: (1) Sheffield (including Rotherham); (2) Derby, Leicester, and Nottinghamshire; (3) parts of Lancashire and Yorkshire; (4) Lincolnshire; and (5) Staffordshire, Shropshire, Worcester, and Warwick. These districts are more or less isolated from one another and need to be considered separately.

The potential market in Sheffield for coke oven gas can be gathered from the fact that the quantity of coke oven gas purchased by the Sheffield Gas Company is approximately 13 million c.ft. per day. The total gas sold by the Gas Company in 1928 was 4084 million c.ft., of which 46 p.ct. was used for industrial purposes.

These figures represent, however, only a small proportion of the potential demand in this district. The following figures of output and coal consumption for the Sheffield area represent returns made by firms coming within the National Federation of Iron and Steel Manufacturers and responsible for 80 p.ct. of the ingot production of the district.

	Tons.
Production of ingots and castings	1,142,763
Production of finished products	604,074
Semi-despatched goods	357,036
Consumption of coal	1,333,542
Consumption of coke	30,899

It is not easy to estimate the proportion of this coal that could be replaced by coke oven gas, as conditions differ so much from works to works. Essentially, the coal used is made up of: (1) Boiler fuel; (2) fuel used for re-heating, forge, annealing and other furnaces; and (3) open-hearth fuel—used in gas producers.

Boiler coal would certainly not be replaced by coke oven gas, as the latter would be more expensive. Fuel used for general furnace practice (apart from open-hearth furnaces) is not altogether easy to estimate.

At one of the largest works in Sheffield, making a variety of products, and generally typical of Sheffield practice, the proportion of furnace coal to total coal used is about 40 p.ct. If this proportion be accepted as an average, the coal used in the Sheffield area for re-heating and general furnace use (exclusive of open-hearth) would amount to approximately 530,000 tons per annum. This figure is possibly somewhat on the high side, and the writer suggests that a total of 450,000 tons per annum would probably represent more accurately the furnace coal consumed.

This coal is either used in furnaces using raw coal or in producer gas-fired furnaces. Coal-fired furnaces are generally of low efficiency—5 to 10 p.ct. They use generally a coal of high quality with a cost at the present time of ¾d. to 1d. per therm. When to this is added the cost of conveying coal to the furnaces, cost of clinker, removal of steam for blowing, and other incidental expenses, the cost per therm is considerably increased and amounts in average practice at the present time to about 1¼d. per therm.

In the case of producer gas-fired furnaces, Sheffield conditions rarely allow of producer operation at the efficiency customary in large works, and a cost per therm of 1·5d. is considered good practice, even with modern mechanical producers.

If coke oven gas is available at the coking plants at 1d. per therm, the cost of distribution to Sheffield steel works operating within a radius of five to ten miles, would be, in accordance with calculations submitted by Dr. E. W. Smith,* of the order of 0·1d. to 0·2d. per therm, which would allow of sale to the steel works at a price of 1¼d. per therm upwards, at which figure it would offer in many works advantages as compared with present practice.

From a knowledge of customary practice in the Sheffield area, the writer is of opinion that average furnace efficiency could be doubled if coke oven gas were generally available instead of coal, and the potential market for coke oven gas from the firms under consideration can be calculated thus:

Present coal consumed in general furnace practice = 450,000 tons per annum.

Assume an average figure of 300 therms per ton of coal = 135,000,000 therms per annum.

With double the average furnace efficiency the same work could be done with 67·5 million therms of coke oven gas.

Allowing 300 working days per annum, this would correspond to a daily demand of 45 million c.ft., corresponding to the gas produced by the carbonization in modern coke ovens of over 2 million tons of coal per annum.

In addition, there is the potential demand for the open-hearth furnaces. Allowing a consumption of coke oven gas of 50 therms per ton ingots, this amounts to 55 million therms per annum, making a total demand for open-hearth and general furnace purposes of approximately 80 million c.ft. per day, representing the surplus gas from nearly 4 million tons of coal carbonized per annum. The iron and steel production in the other districts drawing their coke supplies from this area is shown in Table III.

Table III.

District.	1913.		1927.	
	Production of Pig-Iron.	Production of Steel.	Production of Pig-Iron	Production of Steel.
Derby, Leicester, Notts, and Northants	1,166,100	411,600	995,400	440,000
Parts of Lancs. and Yorks.	503,500		515,700	
Lincolnshire	450,000	241,400	714,400	533,300
Staffs., Shropshire, Worcester, and Warwick	850,700	465,100	459,800	889,100
	2,970,300	1,118,100	2,685,300	1,862,700

The character of the products made in these areas allows of a lower fuel consumption per ton of finished material than is the

* Trans. Fuel Conference; World Power Conference, 1928.

case in Sheffield, and a figure of the order of 70 therms per ton of coke oven gas additional to the blast furnace gas available would probable ultimately meet the requirements of this area.

Leaving out the district of Lincolnshire, potential demand from the other producing areas would be about 100 million therms per annum (65 million c.ft. per day), which would absorb the surplus gas from modern ovens carbonizing 3½ million tons of coal per annum.

Conditions in Lincolnshire are exceptional, but need to be considered in view of the suggestion frequently put forward that coking plants should be located at the steel works and not at the mining areas. Lincolnshire is located at some distance from the coalfield, and the average railway haul for coking coal or for coke is approximately 40 miles.

The present coke consumption is about 31 cwt. per ton of pig-iron, and on this basis the additional transport costs involved by carbonizing the coal at the steel works instead of at the mines can be calculated as follows:

1. *Coal to be Carbonized per Ton of Coke (Based on Average Conditions in South Yorkshire).*

Assume coal has volatile content of 32 p.ct.: Yield of coke (theoretical) from dry coal = 68 p.ct.
Assume coke has volatile content of 1·5 p.ct. and moisture 3 p.ct.: Yield of coke (3 p.ct. H_2O and 1·5 p.ct. vol.) = 71·6 p.ct.
Assume washed coal is used with 10 p.ct. moisture: Yield of coke from 100 parts wet coal = 64·5 p.ct.
Assume 7½ p.ct. of small coke below 1¼ in. is screened out at the coke ovens, and a further 5 p.ct. at the furnaces: Yield of coke charged into furnaces = 56·5 p.ct.
Coal to be carbonized per ton of coke = 35·4 cwt. approximately.

2. *Gas per Ton of Coke.*

Allow 9500 c.ft. of 500 B.Th.U. gas per ton of wet coal = 47·5 therms.
Heat value of gas per ton of coke = 84 therms.
Assume that the heat equivalent of 4500 c.ft. of gas is used for heating the ovens per ton of coal = 22·5 therms.
Gas for heating the ovens per ton of coke = 40 therms.
Surplus per ton of coke, approximately 44 therms.

3. *Transport Cost per Ton of Coke.*

(1) If coke is made at the steel works:
Coal to be conveyed = 35·4 cwt.
Present average railway freights are:

	s.	d.	
Railway freight (average 40 miles)	= 3	8	per ton
Wagon hire	= 0	9	,,
Total	4	5	
Freight on 35·4 cwt. coal carried . . .	= 7	10	

(2) If coke is made at the mines:
Assume 5 p.ct. screened-out at the blast furnaces.
Then coke to be conveyed per ton of coke charged into furnaces = 21 cwt.
Railway freight per ton of coke charged into furnaces = 4s. 7·6d.
Saving in freight per ton of coke charged by carbonizing at mines = 3s. 2·4d.

4. *Saving per Ton of Pig Iron.*

With 31 cwt. of coke consumption = 5s. per ton (nearly).

It is estimated that when the full results of the reduction in railway rates due to the De-rating Act are experienced, the total reduction in transport charges to Lincolnshire will be of the order of 1s. per ton of coal and/or coke conveyed. This amount would probably be divided between the iron and steel and mining industries, so that the figure of 5s. per ton, quoted above, would have to be reduced to about 4s. 6d.

With a consumption of 31 cwt. per ton of pig-iron, there is sufficient blast furnace gas available at the Lincolnshire works to meet the whole of the fuel and energy requirements, except those of the open-hearth furnaces. The ingot production in the district in 1927 was 533,300 tons. On this figure, assuming that 33·3 therms of coke oven gas are used per ton of ingots, the potential demand would be of the order of 18 million therms per annum.

There is sufficient blast furnace gas available to heat the coking plants, so that the whole of the coke oven gas would be available for steel works' use; and, allowing 55 therms per ton of dry coal, this would necessitate the carbonization of about 330,000 tons of dry coal per annum, or allowing for future extensions in steel-making plant (say) 1000 to 1500 tons per day.

The value of the gas to the steel works would be of the order of 1·2d. per therm. If the plant were erected at mines located near the Sheffield consuming area, the value of the gas at the plant would be about 1d. per therm, so that the increased value in Lincolnshire would be calculable thus:

Gas per ton of wet coal—Lincolnshire = 47·5 therms; at 1·2d. per therm = 4s. 9d.; per ton of coke = 8s. 5d.
Gas per ton of wet coke at mines = 25 therms; at 1d. per therm = 2s. 1d.; per ton of coke = 3s. 8d.
Difference in favour of Lincolnshire = 4s. 9d. per ton of coke.

This would go a long way towards neutralizing the increased cost of transport of coal to Lincolnshire as compared with coke; but once the requirements of the open-hearth plants were met, any surplus coke oven gas would have only a very low value per therm, as there would be no other market for it.

Taking all things into consideration, there are certain advantages in having a proportion of the coke made in Lincolnshire, despite the increased transport costs involved; and the development of independent coking plants to meet the requirements of a proportion of the consumption is therefore perfectly logical. On the other hand, the transmission of coke oven gas from the mines to Lincolnshire, a distance of 40 to 50 miles, does not appear to be economically sound, as the gas would have to compete with producer gas at less than 1·2d. per therm, and, when transmission and purification costs are paid, the value to the coking plants would be only about ½d. to ¾d. per therm.

General Summary and Conclusions.

1. This survey, incomplete and imperfect as it is in many respects, indicates the impossibility of assigning a uniform price for coke oven gas, and this will depend ultimately on the price that the industrial consumer can afford to pay. The price will vary in different districts, and even in different plants in the same district.

2. The value of coke oven gas to the industrial consumer must bear a close relationship to the cost of coal, and as most industrial areas in this country are in close proximity to the coalfield, this obviously limits the price which the large industrial consumer can afford to pay to a figure comparable with his coal costs.

3. If there is to be any material extension in the use of coke oven gas for industrial purposes, it will be necessary to enter industrial fields which have so far not been available owing to the relatively high costs of industrial gas. The chief fuel-using industry which has so far not used any appreciable quantities in this country, of either town gas or coke oven gas supplied from independent coking plants, is the iron and steel industry. Depending on local conditions, the price which the iron and steel industry can afford to pay for coke oven gas, purified, delivered, and purchased in large quantities, is approximately 1·2d. to 2d. per therm, based on existing costs for equivalent service.

4. This price refers to very large consumers, and it must not be overlooked that the cost of distribution, and so on, must be deducted before the value of the gas at individual coke ovens can be assessed. From this it will be evident that the value of gas at the coke ovens will, as a minimum, be of the order of 1d. per therm; it is conceivable, depending on the market available, that the value may, in some cases, prove to be somewhat higher, as charges for industrial service naturally vary with the nature of the demand. A factor of the greatest importance would be the distance of the coking plant from the point of consumption.

5. It is doubtful whether a gas network scheme on the scale of the Ruhr gas scheme would be an advantage in any producing area; but it is conceivable that if the gas industry were given greater powers, which would enable the individual undertakings to co-operate and to develop a rationalized method of distribution, so as to secure the maximum of equalization between production and demand over the widest practicable area, the coke oven gas available could be utilized to the greatest advantage.

6. Generally, the greater the development in the use of coke oven gas, the more rapid will be the modernization of coking plant, resulting in the production of more uniform coke and consequent benefit to the iron and steel industry.

Discussion.

The Chairman (Sir Arthur Duckham, G.B.E., K.C.B.) said that he himself had been most interested in the supply of gas from coke ovens to gas-works. At the moment he was in the happy position of being good friends with the gas-works people and being trusted by them, and at the same time he was good friends with the coke oven people and was trusted by them. He had been instrumental in making some of the largest contracts for the supply of coke oven gas to gas-works, and he made the first contract of this nature at Sheffield during the war. His sympathies were entirely with the purchase of coke oven gas by gas undertakings, but at the same time he could not help feeling that they were getting a little unbalanced in regard to this matter. Coke ovens should definitely be the adjunct of iron and steel works. That was the fundamental consideration. By far the most important factor in iron and steel works practice was the quality of the coke that they got for their blast furnaces, because it was the lack of a good quality coke for the furnaces that put up the price of pig iron and so affected the price of iron and steel. Gas had no real relationship in the balance-sheet of a coke oven plant as an adjunct to an iron and steel works compared with the quality of the coke, but too often the consideration was brought in of the price that could be obtained for the gas. With a coke oven plant as an adjunct to an iron and steel plant it was possible to get a certain balance throughout the whole operations, and the further the iron and steel treatment was taken in the plant, the greater use there would be for any surplus gas that might be available. Mr. Evans had mentioned Lincolnshire as an area where there was not much prospect of giving a gas supply outside the works, but, so long as there was a use for the coke oven gas on the works, that seemed

to be about the limit of extension in that area. So long as the blast furnace user could control his coke oven and get an even quality of coke, this was far more important to the cheapness of pig iron than the sale of gas under disadvantageous circumstances. This fundamental point was being rather overlooked. It seemed to him that the rehabilitation of the iron and steel industry in this country must come by some big scheme of rationalization which would mean grouping coke ovens attached to blast furnaces. The development of coke ovens must be in large economic units, possibly two or three or four or five working together. It was not conceivable that small units of coke ovens could live up to the competitive prices obtaining to-day in the world; and therefore development must be in larger units. If it were not practicable to attach coke ovens to the iron and steel works, then definitely some thought would have to be given to see that the gas was properly used.

If there were a second set of distributors of gas in this country, he believed there would be chaos. It was impossible to think of the various coke oven plants competing for the same supply as that now given by the ordinary gas undertakings of the country. It might be thought that the Committee considering this matter would favour the coke oven industry coming together as gas suppliers as distinct from the gas industry, but he was certain that all who had given this matter thought had realized that to have two different suppliers of gas in an area, the gas being of similar quality, would be quite impossible. It was known how much the gas industry had done to develop the sale of gas, and it was known that the gas industry had systems of distribution which did not exist in connection with the coke oven industry. On the other hand, it was difficult to imagine a great development of the industrial use of coke oven gas if that gas was burdened with the necessarily high cost of distribution which was inevitable in the case of a gas undertaking with a multitude of small consumers. Therefore, some steps would have to be taken so that this coke oven gas, not required for other purposes, could be made available at the cheapest possible price to the large consumers, and that these large users should not have to pay distribution charges other than those which were properly allocated to their service. That seemed to him the fundamental point in connection with the supply of coke oven gas to large users; and he believed it was on these lines that the matter was being discussed. The question of the right price to pay was entirely a matter of locality. Suggestions had been made to pipe gas from the Kent coalfields to London; and in a discussion of that matter he had suggested that it might also be necessary to pipe the coke up to London, or do something to get it to London, but it was very difficult to see how gas could be carried 70 or 80 miles to London and compete with gas which in modern London gas-works could be put into the holder for 6½d. per 1000 c.ft. It had to be realized that they were supplying gas in this country at very much lower prices than obtained in other countries of the world; and when he told his American friends that he had made a contract for gas at 13 cents per 1000 c.ft., on the public utility side his friends were very pleased indeed, but on the coke oven side his friends said it was an abominable and absurd price.

They heard a lot about the miles of mains and the gas that was distributed in Germany; but this country was doing equally, if not more, effective work, though not so much was said about it. Coming back to the question of prices, Sir Arthur said this must be entirely a question of locality. It was also a national question, as Mr. Evans had said, and must be viewed from the national point of view. He knew of a gas company paying 11½d. per 1000 c.ft., which was a high price, and he knew of another case in which the price was 2d. to 2½d., which was below the economic value of the gas for any purpose. Therefore it was a matter of consideration as to the price that should be paid. There must be taken into consideration the ease with which gas, for thermal purposes, could be regulated to a nicety, and the manner in which it saved labour. Generally speaking, therefore, he was very pleased that this matter of coke oven gas was receiving attention at the hands of the Government at the present time, though he hoped that it would only be Government interest, and not Government action. He did not think the gas industry would relish the motherly or almost grandmotherly interest that the Government was at present taking in the electrical industry. He knew his friends in the gas industry were rather sorry for their friends in the electrical industry that they had a kind and careful Government looking after them. His friends in the gas industry and in the coke oven industry were not looking forward to that sort of thing; and though the Government could help in many ways, he believed that Government action of this nature would be entirely wrong. The Government could give assistance by helping with investigations and forming committees of broad-minded men to consider the problem; and if the problem was attacked on these lines, with the industries concerned making their own agreements and suggestions, he felt convinced they would go forward to the true economy of the country.

Sir Alexander Walker, Chairman of the Area Gas Supply Committee, said there were so many conflicting opinions in connection with the inquiry with which he was concerned that he was compelled to proceed very cautiously. Broadly speaking, it seemed to him that there was plenty of room for all the coke oven gas to be absorbed even to greater advantage than any other fuel without entrenching on the field of present municipal or company gas supplies, or even on the field of producer gas supply. There was an infinite variety of demand for coke oven gas, and it should be possible to arrive at a figure of cost which should satisfy both the coke oven industry and the gas industry. Again, there was no doubt that the large unit of coke oven production would lower the cost of coke, but he did not believe that that figure would be anything like as low as it should be unless the whole of the gas was absorbed. The question of whether the coke oven plant should be at the iron and steel works was subject to just the same variable factors as was the price to be paid by gas undertakings. In discussing this matter with iron and steel manufacturers, it seemed to be the opinion that, where imported ore was used, then the plants should be erected at the most convenient spots where the ore could be put straight into the furnace; but where blast furnace gas could be used more effectively for the production of coke, obviously, if it were possible to get a balance and carry the operations as far as the rolling mills, &c., in order to absorb the whole of the gas, it would be a great advantage to proceed on different lines. He understood from one steel manufacturer that it would be possible to absorb even all the gas that was made on a modern coke oven plant within the works themselves. One trouble at the moment was to keep the works going on Saturdays and Sundays; and if the plant could be kept in operation for the seven days of the week continuously, then he understood it would be possible to get an almost absolute balance. He was only giving this, however, as he had been told it. Then there was the production of foundry iron; and in some cases he believed it paid better to bring coke to the steel works, while in other circumstances it paid better to bring the ore to the furnaces, whether the ore was imported or not.

The question of the price of coke oven gas seemed to be worth consideration. If it were assumed that it was possible for the coke oven to put the gas into the mains at 6d. or 7d. per 1000 c.ft.—a 500 B.Th.U. gas—and that it was possible to distribute to a public gas undertaking at a very narrow margin, and that the pipes could be used during the day for this off-peak load, and, further, that the large users could put in small gasholders to take the necessary quantity to deal with the peak loads, then it would appear to be very much the same case as with electricity—that the gas could be supplied (assuming it was fed into these small holders between the hours of 10 p.m. and 8 a.m) at a very low price. He happened to be the Deputy Chairman of an Electricity Supply Company which was doing that sort of thing; and the cost question in these circumstances was somewhat similar. It should therefore be possible to supply gas at 6d. and deliver it at 8d. or 9d. to the consumers, and still pay the owners of the pipelines, because, taking it at the off-peak hours, it would not interfere with the ordinary domestic supplies at all, and at the same time it would make use of the pipelines during periods when they were not made use of to any great extent at the present time. This would enable the gas undertakings to develop the industries in their districts; and industries all over the country were clamouring for cheap fuel. It seemed to him that it was the duty of gas undertakings to use this coke oven gas if at all possible.

While he hoped that something useful would result from the work of the National Fuel and Power Committee, he could say nothing at the moment, because he was still trying to steer the boat through various eddies and whirlpools: at the same time, he was hopeful that something would emerge which would be of advantage to the iron and steel industry. If coke could be obtained at 5s. or 6s. per ton less than hitherto, this factor, added to the factors of the utilization of the heat within the furnace and the utilization of imported ore at the ports, where necessary, then they would be a long way on the road to a solution of the very big problem of the reconstruction of the iron and steel industry. At least that was the only object he had in pursuing the work of the Committee.

Mr. H. Clifford Armstrong said that the thing that disappointed him about Mr. Evans' paper, especially as it came from the Federation, was its looseness. Admittedly, it was a very big question, but, at the same time, he expected something better from Mr. Evans. The figure which he gave as the price which the steel works could afford to pay for gas—namely, 1·2d. to 2d. per therm—was a 70 p.ct. discrepancy, but they were not making 70 p.ct. improvements in works to-day. If they made 10 p.ct. they were very pleased, and loose figures such as those he had mentioned were harmful, and did not do any good. Personally he should say the figures given for coke oven gas were rubbish. Mr. Evans had suggested 1·2d. per therm in introducing his paper, but he had previously given a figure of 1·14d. per therm. If one took 210 therms in a ton of coal and 1·14d. per therm, that represented 20s. per ton of coal gasified. Elsewhere in the paper the author mentioned that a figure of 17s. 6d. or 18s. would have to be paid before cartage. If 2s. were added for carting the coal to the producer and removing the ash from the producer, this made a figure of 20s. per ton, but he was certain that this figure of 1·14d. did not include the cost of steam coal fired under the boilers. Taking coal, steam power, wages, and everything else in a modern plant under the best conditions, he did not believe any operators, if they were honest, could say that they were working under 1·4d. per therm. Mr. Evans had mentioned that coke oven gas could be made with great uniformity. While personally he believed that in the modern coke ovens uniformity of gas quality was fairly well secured, he did not know that it was such a simple proposition as suggested by the author.

The Author's Reply.

Mr. Evans, replying to the discussion on his paper, said he was sorry that he had been accused of looseness of expression, because he had tried to make his phraseology as exact as possible. In the case mentioned by Mr. Armstrong of the price varying from 1·2d. to 2d. per therm, this represented the price which should be paid for coke oven gas in iron and steel practice; and since there were iron and steel works in Sheffield paying 2¼d. per therm for coke oven gas, under conditions where producer gas was also being used for other operations in the same works, he felt it necessary to take a fairly wide margin as representing the figures that could be paid under the widely varying conditions in modern iron and steel practice. The price of producer gas was an old controversy between Mr. Armstrong and himself. Mr. Armstrong had mentioned 210 therms of producer gas per ton of coal, but that represented 70 p.ct. efficiency and took no account of the sensible heat in the gas, and it took no account of the tar in the gas. If these two things were taken into consideration it would be found that the efficiency was not 70 p.ct., but more nearly 90 p.ct., and under those conditions the figure of 1·2d. per therm was really too high. Incidentally, added Mr. Evans,

he might say that he had actual costs from a British iron and steel works working on producer gas production with coal at 16s. per ton, and that the cost per therm was 0·85d. to 0·89d., including steam. The figure of 1·12d. per therm included steam, the cost of which was about 1s. 9d. per ton of coal.

He was grateful to Sir Alexander Walker for his contribution to the discussion. Naturally, Sir Alexander had to be very cautious, but it was true what he had said as to the difference in the conditions when ores were imported and when they could be obtained at home. There was, however, a whole class of works like those represented at Sheffield making special products under conditions where there were no blast furnaces; and it was very doubtful whether blast furnaces could be made to pay in Sheffield. The works were located in the middle of an important town using raw coal, which was a very serious nuisance from the smoke abatement point of view; and under these conditions there was an entirely different state of circumstances from those at iron and steel works, where there were blast furnaces and coke ovens on a common site. Thus there were so many circumstances to take into consideration that it was impossible to analyze all of them completely. Both Sir Alexander Walker and Sir Arthur Duckham had emphasized the most important point—namely, that of coke quality. When he mentioned that there was one works in the Midland area to-day using between twenty and thirty different cokes every month, and the blast furnace manager had to work with cokes varying by 8 p.ct. in ash content, it would be realized how difficult the conditions were. The pig-iron cost could be reduced by 3s. upwards per ton, because the use of varying qualities of coke meant a varying quality of pig-iron. The importance of uniform coke could be translated right through to the finished product in reduction of costs by a saving of something like 10s. per ton on the finished steel. This might sound a high figure; but he was sure that if they could get uniformity of coke quality in many British works, it would mean a tremendous impetus to the prosperity of the iron and steel industry. It was that uniformity which they were trying to obtain by the centralization of the coke plants in the country. The old idea of 300 tons a day carbonizing plants was absurd under present conditions; and the sooner they rationalized the coking industry, the better it would be not only for the coking and iron and steel industries, but for all the other industries in the country. It was for that reason that the question of the value of coke oven gas, which was, after all, only a small proportion of the savings that could be effected in iron and steel production, played such an important part.

THE GAS INDUSTRY'S SERVICE TO THE PUBLIC.

By FRANCIS W. GOODENOUGH, C B.E., Chairman of the British Commercial Gas Association; President of the Incorporated Sales Managers' Association; and Chairman of the Government Committee on Education for Salesmanship

[From an Address presented on behalf of the Author at a Meeting of the Special Purposes Section of the North of England Gas Managers' Association, held at the North-East Coast Exhibition, on Wednesday, Oct. 23. Mr. T. P. Ridley, Secretary and Manager of the Newcastle-upon-Tyne and Gateshead Gas Company, presided.]

Two things are necessary to give public satisfaction—efficient production and good service.

To-day, the gas industry is reaping its reward because it has followed this axiom. Its recent progress has been secured through studying the consumers' interest and by the spirit of service permeating its every activity.

The gas industry, through its varied services, makes a valuable contribution to the well-being, health, and comfort of the whole community. It makes no claim to be a philanthropic institution; it has been built on sound business foundations and without one penny contribution from the State. It recognizes that by serving the public it is best serving itself, and it is happy in the fact that the scope of its work and profit runs parallel with public welfare. The real reason behind the amazing progress of gas can rightly be found in the splendid all-round service it renders to the community.

Present atmospheric conditions in our cities and towns are bad enough, but they would be too dreadful to contemplate if the gas industry were to close down. Doctors and statisticians have given careful thought in estimating the damage done to health and property by the smoke curse. The figures are appalling, not only in millions of pounds sterling, but in mortality, impairment of health, and in the lessened working capacity of the nation.

As proof of how gas is helping to abate the smoke pollution of the atmosphere, it may be stated that the new gas appliances fitted in the Newcastle district alone during the last two years have made 32,000 chimneys smoke-free and soot-free. In London the sootfall in 1912 was 76,000 tons. In 1925, though the population had considerably increased, this figure was halved, because, during that period, the number of gas and gas coke burning appliances had been more than doubled. So the progress goes on all over the country. Gas easily leads in the fight for the Sun.

It is a modest estimate that the belching forth of smoke has been abolished from at least two chimneys on an average in each of the nine million homes using gas in this country. From this can be realized the big contribution to the practical solution of the smoke evil that the gas industry has made.

It is the aim of the industry that every consumer should feel that gas service has something about it that makes it regarded as a friend in the domestic life and business life alike, because it serves him and her at every turn in so intimate a way that the user finds it unequalled in utility, convenience, simplicity and economy.

A hidden service that the industry performs, and one with which the public is not so well acquainted, is the thorough testing of all gas appliances by experts. Unless an appliance meets rigid laboratory tests in utility, safety, and economy, it is not offered to the public. In the cause of good public relationship, the industry solicits complaints from any consumer who believes he has grounds for dissatisfaction, in order that the cause may be removed or misunderstanding be cleared up to mutual satisfaction of all parties.

Whenever advice is required as to the best and most economical use of gas, either for domestic or industrial purposes, the experience of specialists is at the disposal of the customer without obligation or charge. Aid is given in the selection of appliances best suited to meet the needs of the individual customer. Advice is offered on how to get, by intelligent use, the utmost value out of every penny spent on gas, and on how to avoid waste; for waste is anathema to the gas industry; it causes complaints and, worst of all, dissatisfied customers. A satisfied customer is worth far more to the industry than any revenue that might be derived from the sale of gas that is wasted.

The gas industry needs the co-operation of the public, and, considering the part played in the nation's daily welfare, it can be truly said that the public need the co-operation of the gas industry. By working in close co-operation with its customers, correcting misunderstandings and enabling them to get the utmost satisfaction out of every gas appliance in use, the gas industry is able to make its service a good service to-day, a better service to-morrow, and ultimately the best service that it is humanly possible to render. That is the ideal to which all in the industry are constantly striving.

A vote of thanks to Mr. Goodenough was carried with applause on the motion of Mr. NORMAN S. COX, Director and Secretary of the Sunderland Gas Company.

Effect of Coal Storage on Coking Properties.—During storage, oxidation and heat may cause considerable alteration in the coking properties, bye-product yields, and analysis of coal. While it is possible, and often desirable, to determine changes in coking properties and bye-product yields by direct methods, there is also frequent need for a method of estimating the degree of coal alteration in storage, from ordinary analysis figures. A paper by H. J. Rose and J. J. Sebastian, presented at a meeting of the Division of Gas and Fuel Chemistry of the American Chemical Society, graphically presents data from many sources, illustrating the various progressive changes in composition which occur when coal is subjected to controlled conditions of oxidation and/or heat. These two factors cause very different changes, but the effect of each is characteristic and well defined, regardless of the source of the coal or experimental conditions. Valuable information may be obtained by graphically comparing the analyses of stored and fresh coal. Either the ultimate analysis (carbon, hydrogen, and oxygen) or a combination of volatile matter (or fixed carbon) with heating value will give satisfactory results. The latter figures are more often available. Preliminary results are given showing the relation between the analysis of coal samples oxidized under known conditions, the character of coke buttons from the volatile matter determination, agglutinating values obtained by the Marshall-Bird test, colour of alkaline extracts, &c.

WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.

Opening Meeting and Dinner.

A well-attended meeting of the Association was held at the Gas Offices, Newport, on Saturday, Oct. 19—Mr. C. B. Felton (Newport) occupying the Chair.

Mr. J. H. Canning, Engineer and Manager of the Newport Gas Company, addressed the members at the outset, and said he was more than pleased to extend to the Association a warm welcome to Newport. He was especially interested in the Junior Associations, particularly the Wales and Monmouthshire, to which many members of his own staff were attached. He was singularly proud to be present in order to support one of his staff whom the members had selected to be their President for the ensuing twelve months.

Mr. W. Stanford, Secretary to the Company, also welcomed the members.

Induction of President.

Mr. C. B. Felton, the retiring President, introduced Mr. W. E. Crowley (Newport) to the meeting, at the same time, wishing him a very successful year of office. He said that Mr. Crowley had been associated with the Wales and Monmouthshire Juniors since their inception, and he had now reached the Presidential Chair, an honour which he richly deserved.

Mr. Crowley, in returning thanks, on behalf of the members, thanked Mr. Felton for his past services to the Association, and presented him with a framed Presidential Certificate.

Presidential Address.

Mr. Crowley then delivered his Presidential Address, which is published in this issue of the "Journal."

Mr. C. H. Collins (Swansea), Senior Vice-President, in proposing a vote of thanks to Mr. Crowley, said he was sure all present had listened to the Address with a great deal of pleasure, and the matter contained in the Address would act as an inspiration to everyone. He wished Mr. Crowley a very happy year of office, and had no doubts whatever that the Association was going forward under his Presidency.

Mr. T. Noall (Cardiff) seconded the vote of thanks, which was carried unanimously.

Address on Education Scheme.

At the request of the Council, Mr. B. J. Bell (Cardiff), Representative on District Committee of the Chartered Institution of Gas Engineers, addressed the members on the now revised Education Scheme. Mr. Bell pointed out that the somewhat restricted conditions had been removed, and that the facilities now offered made it easier for the younger men in the industry to pursue their studies with a view to obtaining the Institution's awards.

The President thanked Mr. Bell on behalf of the members, and said he was sure that what they had heard would prove helpful and beneficial to all present. He hoped that those members who were able would take advantage of the revised conditions under which they could obtain the necessary knowledge.

Election of Junior Vice-President.

It was announced that owing to the departure of Mr. R. J. Williams to Truro, a vacancy as Junior Vice-President had occurred. Two nominations had been received, and upon a ballot being taken Mr. S. E. Brett (Rhondda) was elected to fill the vacancy. There was also a Council member to be appointed, and this resulted in Mr. E. E. Moore (Swansea) being called upon to take up the position.

The President made mention of a welcome visitor that afternoon in the person of Mr. T. A. Canning (London), who was one of the Association's Past-Presidents, and a pioneer in the forming of the Wales and Monmouthshire Junior Association. Mr. Canning was heartily welcomed to the meeting and spoke a few words to the members.

Dinner.

Later in the evening, the members assembled at the King's Head Hotel, Newport, where they were entertained at dinner by the Chairman and Directors of the Newport Gas Company. Toasts during the dinner included "The President" and "The Newport Gas Company." The proceedings terminated with musical items and a vote of thanks to the artistes.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Opening Meeting.

The Opening Meeting of the new session of the London and Southern District Junior Gas Association was held at the Westminster Technical Institute on Friday, Oct. 25. At the outset, Mr. W. Trevor Kenshole, the retiring President, occupied the Chair.

Mr. Kenshole said he was very pleased to see such a large attendance of members at the opening meeting, and he hoped, for the new President's sake, that the attendances would be maintained. The minutes of the last ordinary general meeting were then read and confirmed, after which Mr. Kenshole said that the time had now come for him to relinquish his office as President of the Association, and he did so with every confidence in his successor, Mr. Fred. S. Larkin, A.M.I.Mech.E., Manager of the Gas Light and Coke Company's Fulham Stove Works. They were expecting, he said, to hear a very inspiring address from Mr. Larkin.

Mr. Larkin then took the Chair and proceeded to deliver his Presidential Address, which will be found on other pages of this issue.

Vote of Thanks.

Mr. T. H. Prater (Margate), Senior Vice-President, in proposing a very hearty vote of thanks to Mr. Larkin for his address, said that they had listened to a most interesting and inspiring address, which was a very good sign for the session which they had before them. Mr. Larkin had touched on points of considerable interest, particularly in connection with convection heaters. He had pointed out the practical use of gas cookers. They heard such a lot about efficiencies at the present time in regard to cookers that they were inclined to lose sight of the actual use of the article. Mr. Prater also made reference to the value of the Education Scheme to the industry; and finally thanked Mr. Larkin very heartily for his most able address.

Mr. J. H. Goldsmith (South Suburban), Junior Vice-President, in supporting the vote, said he was very glad to have the opportunity of seconding the vote of thanks to Mr. Larkin. They were extremely pleased that he was to be their President this year, particularly on account of the interest he took in gas from the consumers' point of view. He said it would be interesting if Mr. Larkin could give them some particulars in regard to the use of coloured cookers.

Mr. Larkin thanked those present for the very cordial welcome they had given him. It was a matter of great pleasure to him to accept the position of President of the Association, and he hoped that the session would be a successful one. In regard to Mr. Goldsmith's query as to the use of coloured cookers, he said that the great drawback to these appliances was the ease with which discoloration took place. They were not popular in this country, though they were in considerable demand in the colonies.

Presentation to Mr. Kenshole.

In making a presentation of a silver salver to Mr. Kenshole, in recognition of his year in the Presidential Chair of the Association, Mr. Larkin said that Mr. Kenshole had carried out his duties as President in a manner not surpassed previously, and it had been a pleasure to be associated with him, and he was sorry to have to make this presentation in that it meant the end of his term of office.

Mr. Kenshole, replying, said he felt some difficulty in adequately expressing his thanks for this very acceptable gift they had presented to him. He had some very pleasing recollections of his year as President of the Association, particularly because of the good friends he had made while he held that office. Had it not been for their help and support the year they had just passed through could not have been as successful as it had been.

Presentation to Mr. McSweeney.

Mr. Larkin then presented Mr. T. D. McSweeney (late Assistant Hon. Secretary) with a similar token of the Association's esteem for the work he had done on their behalf. They were sorry to lose his help as Assistant Secretary, but, owing to the position he now held, the time had come when it was impossible for him to serve the Association and continue to do his duty to his Company.

Mr. McSweeney briefly returned thanks for the memento.

Introduction of New Members.

The following new members then were enrolled: Messrs. A. J. Cook, T. G. Noble, B.A., L. T. Minchin, B.Sc., H. F. Caton, C. A. Masterman, B.A. (all of the Gas Light and Coke Company), and F. H. G. Higton (East Surrey Gas Company).

Associate Members: Messrs. H. W. Holgate and C. R. Austen (both of the Gas Light and Coke Company). Transferred from Associate to Member: Messrs. E. P. T. Chambers, B.Sc. (Wandsworth) and E. W. B. Dunning, B.Sc. (Gas Light and Coke Company).

Mr. LARKIN, in conclusion, drew attention to the invitation they had received to visit the works of the Stanton Ironworks Company, near Nottingham, on Wednesday, Nov. 6. He was sure that the number of applications for tickets was a very good indication of the interest taken by the members in these visits.

FUEL RESEARCH BOARD.—ACTIVITIES DURING 1928-29.

The Report of the Fuel Research Board for the year ended March 31 last, together with the Report of the Director of Fuel Research (Dr. C. H. Lander), has now been published, and is obtainable from H.M. Stationery Office, Adastral House, Kingsway, W.C. 2, price 2s. net. It is a record of a remarkable range of work—so wide that any attempt to review it would be absurd in the space at our disposal. There are, however, three questions—low-temperature carbonization, effect of coal size on high-temperature carbonization, and the ignition of cokes of various types—to which brief reference may be made with, we think, interest to our readers. Needless to say, the references give no indication of the extent of the investigations on these particular subjects.

The Chairman of the Board, Sir Richard Threlfall, G.B.E., F.R.S., speaking of low-temperature carbonization, emphasizes once again that the prospects of success of any process must depend very largely on the conditions under which it is worked, and that the market prices of both raw materials and products in any locality may be appreciably affected by the development of a process of low-temperature carbonization in that locality. On the same subject, Dr. Lander observes that some of the processes are, at the present time, doubtless working at a profit, but it does not necessarily follow that they could do so if the scale of working were greatly increased, or if the same process were applied to different coals, or under different conditions. In so far as manufactured coke can compete financially with high-priced coal it will affect the demand for the latter, and hence the supply of cheap coal for coke manufacture. The scale on which low-temperature carbonization is carried out at present is insufficient for this effect to show itself to any appreciable extent; but should any considerable proportion of the 40 million tons of raw coal at present burned annually for domestic purposes be replaced by smokeless fuel, the demand for household coal will be correspondingly reduced, and the resulting loss to the mining industry cannot be made good if coal for carbonizing is sold at the price now ruling for slack coal.

During the year, work was continued on the effect of size of coal on high-temperature carbonization in horizontal and vertical retorts. As regards ease of working of horizontal retorts, states the report, there is little or nothing to be gained by sizing the coal, and within the limits tested there is no very great variation in the yields, when the throughput of the retorts is kept constant. The thermal yield of gas was appreciably the same for all three sizes of any one of the coals tested, but the largest coal gave gas of a slightly lower calorific value than the smaller sizes. The coke yield varied but little with change of size of the coal, but there was a slight tendency for the smaller coal to produce stronger coke and less breeze.

The tar yields, with one exception, showed a progressive decrease as the size of the coal was reduced, this tendency being particularly pronounced with the medium and weakly caking coals.

In the vertical retorts the effect of size, both on the yields of products and on the working conditions, is far more pronounced than with horizontal retorts. The larger sizes were more easily worked than the fine coal, but the relative freedom of passage for ascending gases tended to cause inleak of air through the coke-cooling chamber, this being most noticeable with the weakly caking coal. Difficulties arose when using the fine coal owing to the carrying over of dust into the gas main and tar tanks. The tests were all carried out with steaming to the extent of 10 p.ct. by weight of the coal charged.

As with the horizontal retorts, the yield of coke did not vary much with alterations of size of the coal, but there was a tendency for the yield to increase slightly with the smaller sizes. There was also an increase in strength in the coke from the smaller sizes, the gain in strength increasing with decreasing caking power of the coal.

The volume of gas produced decreased with all three types of coal as the size of coal was decreased, but the calorific value increased. The net result on the therms produced per ton of coal was a decrease with decreasing size with the strongly caking coal; the medium caking coal showed little variation; while with the weakly caking coal the thermal yield was greatest with the medium size and least with the large size, the maximum variation being about 5 p.ct. The most striking effect of the size of the coal was the increase in the tar yield resulting from the use of the larger sizes.

The general result of the investigation is to confirm that the influence of size of the coal charged is greater with vertical than with horizontal retorts, and that with vertical retorts those variations offer a means of controlling, to some extent, the yields and qualities of the products to suit the needs of particular circumstances. The investigation also shows the possibility of using coal with a lower caking index than is generally employed by the gas industry, and that such coal may have advantages in the direction of ease of working and increased yields of tar.

Tests of the ignitibility of various cokes, based on the minimum gas consumption required to render them capable of supporting independent combustion, and upon the rate at which they subsequently burn up to a maximum radiation emission, have proceeded in sitting-room grates, both of the barless type and of the vertical-fronted type with bars. A simple standard method has in general been used, whereby a combustibility curve is obtained from radiation readings taken at a suitable position opposite a fire of 8 or 10 lbs. of fuel, over a period from lighting to dying out.

Cokes containing large proportions of water were naturally relatively difficult to ignite, and yielded radiation which was reduced both in intensity and total amount as compared with that emitted from fires of dried coke. But the moisture content of the fuels tested was consistently below 5 p.ct.

The size to which a coke is graded has also been found to bear a close relation to the rate at which it burns up. In a barless grate, for instance, low-temperature cokes burnt most quickly when graded to 1½ in. to 2 in., gas coke when graded to 1 in. to 1¼ in.; while in a vertical bar grate 1 in to 1¼ in. was found to be the best size for either low or high temperature coke. Further, the diminution in the rate of burning up, as the size of the fuel was increased above the optimum, was more marked in the vertical bar grate than in the barless grate; while the diminution brought about by decreasing the size of the fuel below the optimum was more marked in the barless grate. For comparative tests, the fuels were, where possible, graded to approximately the optimum size.

A specially constructed gas firelighter consuming 15 c.ft. of 560 B.Th.U. gas per hour was used for starting the fires. Low-temperature cokes could be lighted on a consumption of 2 to 3 c.ft. (1120 to 1680 B.Th.U.), according to their character and condition, and rapidly burned up to bright, intense fires in either type of grate. Increase in the rate of gas consumption had little effect on the behaviour of the fire. The unburned residue left after the dying-out of a single charge of 8 lbs. of fuel amounted to about 25 p.ct. by weight of the total. Gas cokes, on the other hand, needed at least 4 c.ft. of gas (2240 B.Th.U.) for ignition, and left about 35 p.ct. of the original charge unburnt; but in this case both ignitibility and subsequent combustibility were improved by increasing the rate of gas consumption. The influence of both rate and amount of gas consumption is consequently being further investigated.

In addition to low-temperature cokes and gas cokes, the behaviour of three samples of oven coke was examined in open grates. It was found possible to ignite these by a consumption of about 7 c.ft. of gas (3920 B.Th.U.), but they failed to produce satisfactory fires, and died out when only about half of the charge had burned through. By increasing the gas consumption still further, however, until combustion was really well established, and the surroundings of the grate were warmed up, very fierce, bright fires could be obtained, which could probably have been maintained indefinitely, though under the preliminary test conditions the original charge was allowed to die out, and 40 to 50 p.ct. of the coke was left unburned. It thus appears that, though gas cokes or oven cokes cannot usually be lighted easily by ordinary methods, yet where a gas firelighter is available low ash-content rather than easy combustibility may prove to be the most important criterion of a good household fuel.

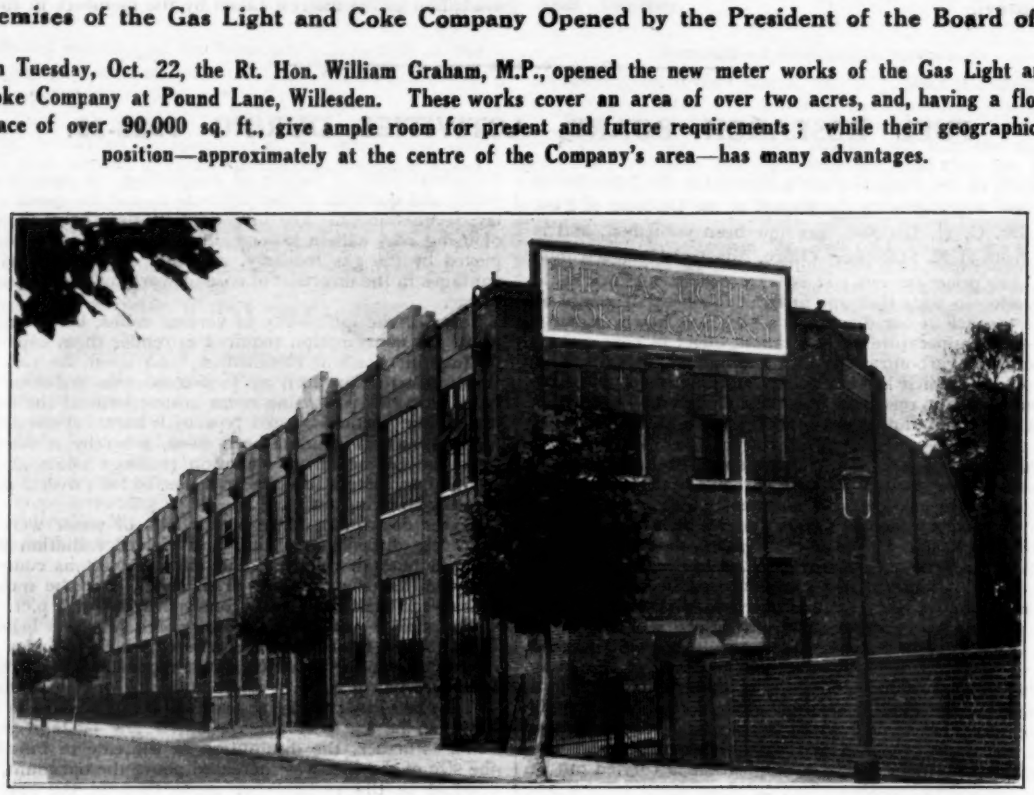
A series of tests of cokes having approximately the same structure, but varying in the proportion of volatile matter retained, showed that both the ease of ignition and the rapidity of burning became progressively greater as the volatile matter increased.

Experiments on a series of cokes produced under different conditions of carbonization showed the combustibility of cokes produced at 800° C. and 900° C. to be considerably less than that of those produced at lower temperatures—*i.e.*, 400°, 500°, 600°, and 700° C. Of the latter, the lowest-temperature coke burned up most easily, the rate of burning-up falling off slightly in the following order of temperature of production: 400°, 500°, 700°, 600° C. Between the 600° C. coke and the higher temperature ones there was a marked drop in combustibility, but of the two the 900° C. coke burned up slightly more quickly than the 800° C. one.

CENTRALIZED METER WORKS AT WILLESDEN.

New Premises of the Gas Light and Coke Company Opened by the President of the Board of Trade.

On Tuesday, Oct. 22, the Rt. Hon. William Graham, M.P., opened the new meter works of the Gas Light and Coke Company at Pound Lane, Willesden. These works cover an area of over two acres, and, having a floor space of over 90,000 sq. ft., give ample room for present and future requirements; while their geographical position—approximately at the centre of the Company's area—has many advantages.



GAS LIGHT AND COKE COMPANY'S NEW METER WORKS AT POUND LANE, WILLESDEN.

The amount of gas sold by the Gas Light and Coke Company in a year, now close on 250 million therms, is steadily increasing; and this increase in output naturally involves development in every department in the Company. Not the least important item in this development is the continual growth of meter work. In the area supplied by the Company there are over 1¾ million meters, and, of these, approximately, 112,000 are returned to Pound Lane during the course of a year.

Meter Policy.

It is the policy of the Company to strive for the highest possible standard in consumers' meters. In the past few years the standardization of meters has been aimed at in the belief that this will result in a decrease in their cost. Standardized meters are also more interchangeable, and so more conveniently fitted. As a result of the Company's efforts in conjunction with the various firms of manufacturers, the number of different types of meter has in the last few years been reduced from 47 to 11. One improvement resulting in a reduction in the number of types has been the introduction of prepayment meters which can easily be altered, without removal, to take shillings or pence. Large stocks mean capital lying idle and meters outrunning uselessly their maker's guarantee period; and a notable result of the reduction in types has been a reduction in stocks, with corresponding economy in working. The centralization of meter storage at Pound Lane has led to further savings in this direction.

The Company's endeavour to ensure that all meters in use shall, so far as is possible, be of the most up-to-date and efficient types has found expression in a "scrapping scheme," under which if a meter brought in from the district for repairs is of an obsolete type or needs expensive repairs it is scrapped. All new meters purchased by the Company are now of the high-capacity type.

The Pound Lane Works.

Prior to the opening of the new works at Pound Lane, Willesden, meters were being reconditioned and tested at three works in different parts of the Company's area—one at Haggerston, one at Fulham, and the third at Brentford. All these works were becoming overcrowded; and it was decided to secure completely new premises, which could be laid out on the most modern and economical lines for dealing with the meters in the whole of the Company's area and allow for the development of the work on gas fires, cookers, water heaters, &c., at Haggerston and Fulham.

Repairing and Testing Meters.

The operations carried on at Pound Lane are divided into work done on meters returned from the district, and the receipt and testing of new meters.

The repair work is concerned with meters sent back after removal from a consumer's house. When a meter reaches Pound Lane in this way the first thing done is to wash off all the paint and to examine the case, when clean, for cracks or flaws. The meter is then tested for accuracy, and the subsequent procedure depends on the result of the test. If any considerable damage is found, the meter is sent back to the makers for attention, or to be scrapped. Minor damage or defects are dealt with at Pound Lane; while, if the meter is in a satisfactory condition, it goes direct to the painting plant.

After any mechanical repairs have been carried out, it may be necessary for the meter to be officially tested by the London County Council or the City Corporation. If the meter is found to be correct, the Local Authority concerned stamps and seals it, and it is returned to Pound Lane, where it is again tested by the Company. The meter is now ready to be painted. Each type of meter is spray-painted to a certain colour, so that the type may be distinguished at a glance. The meter is then sprayed inside with oil, to ensure easy working, and to maintain accuracy; a number is stencilled on it; and the Company's label affixed. This completes the process.

New meters are supplied direct to Pound Lane by the makers, in motor vans. On delivery all meters are subjected to thorough examination and testing, to see if they are up to the high standard demanded by the Company. If satisfactory, they are treated in the same way as the meters which have been repaired, and, after labelling, are, like them, either stored or issued to the district.

Output of Pound Lane Works.

On an average, 6000 meters are tested every week, but this number could be increased to 10,000 with the existing accommodation. The average number of meters repaired in a week is about 300.

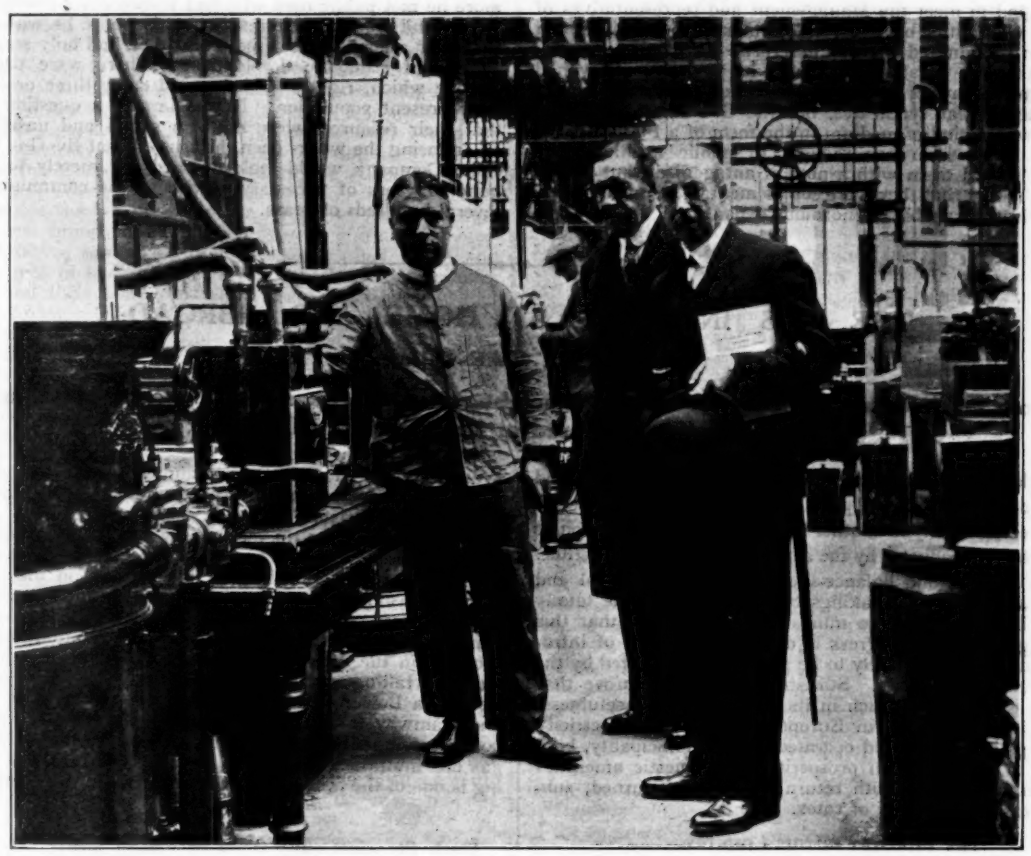
In the test room there are 36 benches, each supplied with gas, water, and air at different pressures—air being normally used for meter testing. There are 71 small bells containing air or gas, and a larger one, of 200 c.ft. capacity, has been constructed for use with large meters. It may be noted that the

test room contains two miles of piping of various diameters, while the whole building contains altogether 3½ miles.

In addition to repair and test work, Pound Lane stores meters, and ample provision has been made for storage; for, though it is the policy of the Company to keep stocks as low as is consistent with safety and public service, it is inevitable that, as business expands, so will meter stocks. Various kinds of stoves, to the number of approximately 12,000, are also stored at Pound Lane; the works acting as a store for the Company's north-western district. Between 10,000 and 12,000 fires, cookers, radiators and the like are received at Pound Lane every year and issued direct to consumers.

THE OPENING CEREMONY.

The opening ceremony was marked by a luncheon at the works, over which Sir DAVID MILNE-WATSON, D.L., LL.D., Governor of the Company, presided. Among those present, in addition to Mr. Graham, were: Messrs. Percy Ashley, C.B., Principal Assistant Secretary, Board of Trade; R. M. Holland-Martin, C.B.; T. Goulden; W. J. Morton, Chairman of the Public Control Committee, London County Council; W. A. Hill, Chairman of the Willesden Urban District Council; A. G. Chaming, Chief Officer, Public Control Department, London County Council; R. A. Robinson, Chief Officer, Public Control Department, Middlesex County Council; J. Sears, Deputy Warden of the Standards, Board of Trade; E. J. Jessop, Superintendent, Gas Meter Testing Department, London County Council; and A. N. Barrow, J.P., President of the Association of Statutory Gas Meter Inspectors.



THE RT. HON. WILLIAM GRAHAM, M.P., PRESIDENT OF THE BOARD OF TRADE, WITH SIR DAVID MILNE-WATSON, INSPECTING THE EQUIPMENT OF THE NEW METER WORKS.

The CHAIRMAN, extending a hearty welcome to Mr. William Graham, said that they would all agree that, in finding time to be with them, he had paid a high compliment to the Gas Light and Coke Company. Actually, he had left a Cabinet Meeting in order to open the Company's new premises in Pound Lane. Sir David Milne-Watson also welcomed the other public men who had honoured the Company with their presence, and mentioned that representatives of the Co-Partners of the Company were present to complete what could aptly be described as a family gathering. He did not desire to speak at any length, but there were one or two points to which he would like to refer. First of all, the Company's increase in gas sales—notwithstanding competition from electricity—was continuing in most satisfactory fashion. To exemplify this, he would mention that in the last five years the increase had exceeded that of the twenty years immediately previous. This was surely a tribute to the vitality of their business. He did not wish to burden them with statistics, but perhaps they would be interested to learn that on several occasions they had to cope with as many as £50,000 worth of pennies in their premises in Horseferry Road, that they had about 1¼ million consumers, and that during the past year they had fitted 1000 miles of service pipes in consumers' houses.

RAISON D'ETRE FOR NEW PREMISES.

This great growth in business, continued Sir David, had brought about the present centralization of their meter work. Prior to the organization at Pound Lane, they had three depôts dealing with this particular phase of their business—one at Fulham, another at Haggerston, and the third at Brentford. They had found, however, that, by concentrating the work at Willesden, it could be done better and more expeditiously, and the stocks they had to carry could be reduced. In the new premises at Pound Lane they were now undertaking the meter testing and minor meter repairs for their entire district—an area which, he would remind them, extended from Epping Forest to Windsor.

ACCURACY OF THE GAS METER.

Then, said Sir David, he would like to refer to the accuracy of the gas meter, and to take the opportunity of allaying any suspicion regarding this. Unfortunately, many people had short memories; in April they forgot the cold in January and February, when the gas fire came to their aid, or the periods of sickness when gas proved invaluable. When they received their bills for the service rendered they suggested that the meter must be wrong. As a matter of fact, of the meters which were returned to the Company, two-thirds of those which were not registering correctly were in favour of the consumer. Moreover, the meters challenged by the consumer—*i.e.*, those sent to the official testers for reverification—represented only 0·5 p.ct. of the total meters in use on the Company's area.

On their tour of inspection, they would have noticed the high-capacity meter. Owing to the increased load due to the installation of cookers and fires, consumers' meters of the old type were overtaxed; and it was often difficult to instal a meter sufficiently large to cope with the demand, due to lack of space on consumers' premises. The high-capacity meter had, however, afforded a solution to this difficulty; and those present would have seen a large meter of the old type capable of passing 3000 c.ft. of gas an hour, and side-by-side a high-capacity meter having the same size of case, but capable of passing 15,000 c.ft. an hour.

He would refer also to the activities of the Company on the social side. A Sports Association, with over a hundred acres of ground in various parts of London, provided facilities for almost every kind of sport and recreation for the members—of which there were over 8000—and their wives and families. Then the Company had Approved Societies, and a War Memorial Fund established from funds provided by the Directors and run by a scheme of joint voluntary contribution. This Fund was largely administered by co-partners. The Co-Partnership Scheme was twenty years old, and had proved one of the greatest blessings of the Company. Of the Company's stock, £800,000 was held by co-partners; but the financial aspect was not the most important—it was the spirit of co-partnership itself which constituted the greatest value of the scheme.

Mr. Graham Opens the New Premises.

The Rt. Hon. William Graham, in declaring the new premises open, said that his duties during the four months which he had already spent at the Board of Trade had impressed him with the fact that there was practically no subject which the Department did not cover; and anyone who held the office of President must expect to gain a wide and interesting experience. He had looked forward to the present occasion; and he could assure them that it had been a happy experience. He had been glad to meet the Management and representatives of the Works Committee of a very great enterprise. Mr. Graham said that in its hundred years of enterprise the Company represented one of the great developments in industry. They had passed from the days of small-scale individualistic production to combines and great syndicates, but the Gas Light and Coke Company was a kind of medium in the form of a Public Utility Company; and when they thought of public utilities, they should not regard them with a note of antagonism, but should recognize the fact that they were complementary to one another, and that all were capable of enormous expansion. In the Company much had been done to preserve the human note. All students of economics agreed that one of the largest problems to be faced was the gulf that often existed between the management and the vast mass of people engaged in the concern. In the years that lay ahead, whatever form the industrial changes in this country took, that issue must be before them. He would gladly pay his tribute to the welfare work and co-partnership schemes of the Company. They must march forward in the spirit that they were not the trustees of some fixed concern, the boundaries of whose progress had been set, but were really speaking in the name of an undertaking that could expand far beyond even their most optimistic ideas to-day.

Value of Optimism.

When he was at the Treasury in 1924, he was depressed by a study of the tremendous burden of war-debt and a sense that economically this country had shot its bolt, and was not capable of response to the changed conditions following the war. To-day, many people looked across the Atlantic and at European competition, and said that this country must be content with much less than the place it enjoyed in pre-war times. In a great public utility undertaking, or, indeed, in any branch of British industry, they should guard against such a disposition. They had everything to gain by being soundly optimistic. The more he met public men who had visited other countries in the world, and studied their resources, the more he was convinced that over a large part of the world they had only scratched the surface of economic development. There were countries in Europe which, rightly guided, could carry three or four times their present population. It was largely a question of seeing that their resources were used on sound and unselfish lines. In declaring the works open, he trusted that the Gas Light and Coke Company would look forward not merely to a further hundred years of necessary service to the community, but to several hundreds of years.

THE GAS INDUSTRY AT HOME AND ABROAD.

By F. J. West, C.B.E., M.Inst.C.E.

[From an Address as Chairman of the Manchester District Association of the Institution of Civil Engineers. Delivered in Manchester on Oct. 16.]

The world-wide development and the continued progress and expansion of the gas industry parallel with the increasing supply of low-priced electricity is another instance of the stimulation of an old established industry by the activities of a new competitor. The yearly returns and balance-sheets of both municipal and privately-owned gas undertakings completely dispel the totally erroneous impression in the minds of many people that this continued growth and progress is due to its priority of introduction and that it was likely to be prejudicially affected by the advent of cheap electricity. Statistics conclusively prove that both thrive side by side, each in its own sphere of usefulness. In many cities, especially in Europe, both gas and electricity undertakings are owned and operated by the municipality, both contribute to the industrial prosperity and domestic amenities of the community, and both return, and have returned, substantial sums for the relief of rates.

The Industry in this Country.

The magnitude and financial success of the gas industry in Great Britain is reflected in the Board of Trade returns published in December, 1928. The total capital invested, including loans borrowed by local authorities and since repaid, was over 183 million pounds, and a gross profit of over £11,200,000 was earned. About half of this capital is in the form of shares in privately-owned companies, and these rank with the gilt-edged securities of the country.

In his evidence before the Coal Commission of 1925, Sir David Milne-Watson, the Governor of the Gas Light and Coke Company, stated that the number of men engaged in the industry was over 100,000, with an annual wage roll of over 15 million pounds. It is estimated that the number of persons using gas in Great Britain is over 36 millions, or practically the whole population.

North America.

While Great Britain is generally regarded as the pioneer country in the development of the gas industry, the great countries of North America, the United States and Canada on the other hand, may be termed the stronghold of electricity. Yet the sale of gas in the United States is four times as much as that in Great Britain, the capital invested in gas undertakings is nearly 600 million pounds, and the consumption of gas per head of population in the large cities of America exceeds that in several of those in Great Britain. For instance, the average consumption of gas per head in New York, San Francisco, and Washington is 12,500 c.ft. per annum, as against 9200 c.ft., which is the average annual consumption per head in London, Sheffield, and Bristol.

In Canada, during the last twenty years, the consumption of gas has increased 350 p.ct., despite the fact that Canadians are probably the most lavish users of electricity in the world, the annual consumption per head being approximately double that in the United States. The development of the use of gas in Vancouver is a striking example of the relation between the progress in the demands for gas and that for electricity. The gas undertaking was purchased 20 or 25 years ago by the British Columbia Power Company, which also operates the electricity and tramway undertakings, primarily to remove or control a possible competitor. Since the purchase the annual output of gas has multiplied itself by eight times, and the gas undertaking is one of the most profitable properties of the Company.

Other Countries.

Much the same story could be told of nearly every country of the world. In Switzerland and Scandinavia, where water power has been fully developed for the generation of electricity, that industry lives side by side with a flourishing gas industry.

In Japan electricity was introduced in many towns before the advent of gas; but to-day there are over 150 gas undertakings in Japan, and the Tokio Gas Company is an outstanding example of a successful and enterprising concern making rapid strides in the supply of gas for industrial and domestic purposes. During the last three years this Company alone has placed contracts with British firms for carbonizing plant to produce 8 million c.ft. of gas per day to cope with their increasing business. Nearly all the principal cities of Australasia are equipped with prosperous gas undertakings, generally operating in parallel with State or municipally owned electricity supplies.

Even in warm climates the rapid progress of gas supply is no less remarkable, and in such places as Bombay, Buenos Aires, Calcutta, Colombo, Hong Kong, Rio de Janeiro, and Shanghai there is a steady increase in the use of gas for industrial and domestic purposes. Johannesburg is an outstanding example of a city in which electricity is freely applied to every possible purpose, and yet the spontaneous demand of the population resulted in the recent erection of a new gas-works [see "Journal" for April 10, p. 89] which, it is felt, is only the first instalment of the expansion which is sure to follow as the convenience and economy of gas for most heating and cooking purposes is more widely appreciated by the people.

The climate of Johannesburg is such that artificial heating is necessary for short periods of the day—that is in the evening and early morning—over considerable periods of the year, during which the high day temperatures render heat unnecessary. In such circumstances, gas is without a serious rival. It can be brought instantly into use, and as instantly checked when no longer needed and used for this purpose, as well as for cooking and water heating, while it enables coloured labour within the house to be dispensed with, and all this at a much less cost than the cheapest electricity. Indeed, it can be stated generally that gas has no economic rival in two definite aspects of modern life—in the domestic field for cooking and heating and in the industrial field for central heating and a wide variety of commercial and industrial processes in which heating is the principal requirement.

Gas in Industry.

The foregoing statements give only a very brief and sketchy outline of the activities of the gas industry. Its present high standard of efficiency has made great demands on the technical skill and powers of invention of the engineer. The design and installation of a modern gas-works embraces civil engineering in the preparation of the site, foundation work, structural steelwork, and buildings often of abnormal dimensions, mechanical engineering represented by a great variety of power generation and transmission plant, hydraulic apparatus, waste-heat recovery plant, coal and coke handling machinery. Electrical engineering is freely applied to the power and transmission requirements, and chemical engineering has great scope in the apparatus and machinery for the treatment of bye-products.

The modern gas-works, as those of my hearers who have had the opportunity of visiting the new Partington Works of the Manchester Corporation Gas Department will know, is no longer a dirty, evil-smelling place, periodically enshrouded in a cloud of black smoke. It compares, as regards the emission of smoke and fumes, quite favourably with the modern electricity generating station, so that it is quite capable of doing justice to visits of inspection on the part of Royal personages, Ministers and their ladies, of which there have been several interesting and encouraging instances within the last few years.

Brain has taken the place of brawn in the gas-works. Generally, in a modern works, the whole of the raw materials and productions are handled by automatic machinery, and are never touched by the hand of man. Labour is reduced to operating switches, valves, levers, and doors.

It is quite impossible to give, in a short address, any adequate idea of the enormous variety of industrial purposes to which town gas is now economically and successfully applied. No fewer than 3000 of such processes have been scheduled. In Birmingham, which is served by the largest gas undertaking outside London, over 20 p.ct. of the gas output is applied to industrial purposes, and several other towns show industrial loads of comparable proportions.

The President of the American Gas Association said that in the United States in 1927 some 28·4 p.ct. of the total sales of gas was applied to commercial and industrial heating purposes.

Efficiency.

The thermal efficiency of the gas-making process is very high. The modern carbonizing plant, equipped with waste-heat recovery apparatus, reaches an efficiency of 88 p.ct. of the thermal value of the coal supplied to it—a figure which is to be compared with the 25 p.ct. thermal efficiency of the most modern electricity generating station. Indeed, so rapid has been the increase in efficiency during the last twenty years in this country that, whereas the total annual production of gas increased from 188,487 million c.ft. in 1907 to 297,697 million in 1927—an increase of 57½ p.ct.—the quantity of coal used in the satisfaction of this enormously increased demand only increased from 15·4 million tons to 17·7 million tons—an increase of only 16½ p.ct. In fact, as in the electricity and other industries, the growth has been nearly met by the increase in efficiency without anything like a corresponding increase in the consumption of the irreplaceable raw material, coal.

Low-Temperature Carbonization.

You may be sure that both the technical and the commercial men of the gas industry are examining very carefully the two or three hundred proposals for the carbonization of coal at low temperatures, which have been put forward during the last twenty years, more particularly, of course, during the last ten years, stimulated by the necessity to find solutions for the two great problems arising out of the smoke nuisance and the huge demand for liquid fuel.

It is difficult, perhaps, to convey to an audience, among whom are very few who have been actively engaged in the carbonizing industry, the reasons for the careful attitude which is necessarily adopted towards these proposals by the gas industry. A hundred-and-twenty-five years of practice has placed at the disposal of the gas engineer a very large amount of data on the possibilities of coal from the point of view of heat treatment. In the early years of gas, temperatures quite as low as those now proposed were the order of the day. It is economic pressure which has forced carbonizing temperatures up to the maximum which can be withstood by the refractory materials available. These high temperatures have resulted in the production of the maximum quantity of gas, of qualities within marketable limits, from the ton of coal. At the same time, most of the modern systems of carbonization can be, and are, whenever market conditions render it advisable, modified to increase the liquid bye-products and to improve the free burning qualities of the coke.

Nor is the gas industry by any means neglecting such of the low-temperature processes as appear to be practicable propositions. At the present time the great London gas companies have installed, and are operating, several of these systems, and at least one of the Northern municipalities has been operating another for a considerable period.

The gas industry has been operating high-temperature processes which are economically sound, because they result in products the aggregate value of which leaves an adequate margin over that of the raw coal to cover the cost of the process and the distribution of the products. If any of the low-temperature processes are to succeed, they must be able to produce solid smokeless fuel, tar oils, and gas of an aggregate value sufficient to provide a similar margin; and at the same time they must be fitted into the existing markets for solid and liquid fuels and for gas. So far, in spite of the expenditure of sums of money which have been variously estimated between five and fifteen million pounds, it has not been satisfactorily demonstrated that coals can be carbonized at low temperatures to show a profit, except in exceptional cases where the price of the raw coal is very low in proportion to that which can be obtained for the resultant solid fuel.

To quote Lord Hartington (speaking as President of the Society of British Gas Industries): "Taking a long view, it would appear that, though there may be cases where the process of low-temperature carbonization can be run successfully as a comparatively small subsidiary part of the operation of gas undertakings, the future does not hold very much prospect for the wholesale development of this system." And while it may be that some collieries may be able to use the process for the "grading-up" of low-priced washed slacks, to quote the same authority, "the low-temperature process does not offer any short cut to a solution of the difficulties which have beset the coal trade in the past, as some optimistic politicians or interested financiers have affirmed."

Smoke Abatement.

On the other hand, it is claimed with the greatest confidence that not only have the gas and electrical industries already contributed very largely to the solution of the smoke nuisance, but they offer a complete solution of the problem, at any rate from the technical point of view. The economic point of view is another matter. In industry the application of electricity to power purposes and the application of gas to heating purposes, coupled with scientific methods of consuming solid fuel, have effected a complete solution both technically and economically. The domestic heating problem is more complicated, but by no means incapable of solution. Already convenience and comfort are dictating the installation of gas fires and gas cookers in many thousands of small houses, and, for the larger home, central heating with coke as the fuel is both economical and convenient. The smoke nuisance has already to a great extent disappeared.

There is still immense scope for the ingenuity and enterprise of the engineer. This country has always provided the vanguard of technically and practically trained engineers to take leading places in the world's engineering developments, though the statements of some of our pessimists endeavour to persuade us that we are falling behind in this respect. We do not believe for a moment that we are failing to hold our place in the supply of leaders in industrial development. On this point one can only state that many instances are forthcoming in one's travels of preference for British-trained engineers for leading and key positions in many branches of engineering industry, despite a natural tendency to provide facilities for, and to give encouragement to, men trained locally.

Managerial Ability.

This subject provides an opportunity for reference to the education and training of the engineer as regards one particular phase, the capacity to control and lead others. There are few instances where engineers operate in what might be termed a single-handed way. They are probably more dependent than any other profession or class on the help and co-operation of others to bring their plans to a successful issue. A close study of industrial problems, the occupancy of the Presidential Chair of the Manchester Engineering Employers' Association during the years 1916-17, and membership of the Industrial Arbitration Court for two years have all brought to my observation and compelled me to give close study to a wide range of industrial problems and difficulties, and have left the outstanding impression that a very considerable portion of industrial unrest and many petty disputes, which later grow into

real differences, are the outcome of some weakness and inability on the part of many of those in mangement and supervisory positions to handle the personalities of their men. It is essential for the good management of any concern that the decisions of those in authority should not too frequently be brought into question, that prestige and authority should be maintained, and that confidence and respect should be secured, and this state of affairs is only possible by the exercise of tact and diplomacy and by careful and sympathetic consideration of human nature and the human element. From time to time one comes into contact with men who appear to possess the highest technical and practical qualifications, but fail lamentably in positions of responsibility, owing to their failure successfully to control and direct others. On the other hand, one is frequently confronted with the case of a man with moderate technical and practical training who makes a brilliant success in a position of responsibility, mainly because of his high competence in dealing with the human element.

The Manchester Engineering Employers' Association realized this when they established at the Manchester College of Technology in 1918, by arrangement with the Education Committee, the Department of Industrial Administration. This Department has evolved courses of study with the explicit purpose of preparing men for responsible administrative posts, and endeavours to provide training to meet the demands for efficient service and intelligent leadership in the industrial world.

One often hears the statement that a certain person is a "born leader." There is some truth in the idea, but, at the same time, while some persons appear by intuition to possess the capacity for leadership, it is within the reach of all to cultivate the necessary qualifications. Failure in the past has many times arisen from insufficient consideration and lack of appreciation of the essentials to success in supervising others, and, while there is no golden rule, tact, diplomacy, and a sympathetic consideration of the human element are the main qualifications to which study and practice should be devoted.

RATIONALIZATION.

By J. DAVIDSON PRATT, O.B.E., M.A., B.Sc.

[From a Paper before the Chemical Engineering Group of the Society of Chemical Industry.]

Rationalization is not the restriction of output to create a shortage and to maintain prices at a remunerative level whatever the costs of production may be. Such methods are anti-social; they check the expansion of markets, restrict employment, and may put a premium on inefficiency by providing profits to businesses of which the management, organization, equipment, and methods may be far below the standards set by present-day requirements.

Rationalization, on the other hand, requires the utmost exercise of the co-operative spirit, the pooling of the results of research, and of all technical and scientific knowledge, and the subordination of private interests for the general good of the whole industry, even where the private interests may appear to reap immediate benefits by non-participation in the common scheme. The team spirit must be fostered and the long view always taken.

It is necessary to consider the possible ways of effecting rationalization of an industry. In the first place, it is not considered that nationalization would be a satisfactory method, since an industry organized on Government Department lines would become a ponderous and slow-moving machine, which could not possibly satisfy the requirements for quick decision and action which are essential in modern commercial activities, especially where keen foreign competition is involved.

Civil service methods, as they at present exist, though admirable for certain purposes, are fundamentally unsuited for the commercial world, so it is proposed to dismiss nationalization without further discussion.

Two other methods are available—namely, (1) amalgamation; (2) association. By amalgamation is meant the combination of all the units or individual firms in the industry into one large corporation controlled by a single board of directors. This method has certain great and obvious advantages, because, once the policy and scheme of rationalization have been settled, it is easy to carry them into effect, since there is only one set of interests to consider—namely, those of the corporation as a whole.

Amalgamation facilitates the pooling of research resources, the redistribution of production, and the concentration of purchases and sales; it simplifies the financial arrangements involved in the closing-down of the less efficient or redundant plant, and it provides the large capital resources which are necessary for the extended replacement of obsolete manufactures by the latest type of equipment and for the technical development of new processes and methods of manufacture. The last-mentioned point is specially pertinent to the chemical industry, where new and expensive developments, such as the hydrogenation of coal, can only be undertaken by a corporation with large financial resources. Small units would find it difficult, if not impossible, to finance work of this nature, which might well prove unproductive in the end. Further, a powerful co-operation can resort to litigation to protect its interests and patents from foreign attack, which might be too expensive for a small concern, even if it were to win in the end.

While it must be admitted that there are undoubtedly great advantages to be gained by adopting the process of amalgamation as a basis of rationalization, the disadvantages of the method must not be overlooked. There may be a strong tendency for the headquarters staff of the organization to immerse itself too much in the executive details of the scheme, and thus to become a bureaucratic, slow-moving organization, with all the defects that would accrue from a nationalized industry controlled by civil service methods. The British characteristic which has proved so valuable in the development of industry in the past has been an innate individualism which is antagonistic to any form of bureaucratic control; and this is likely to prove one of the strongest arguments against wholesale amalgamation. At the same time, there is no reason why an amalgamation should not be organized so that the various parts of the corporation maintain full responsibility for carrying out the work assigned to them in accordance with the general policy of the directing board. The administration must, therefore, be arranged to avoid in every possible way the risk of inflexibility and slow movement of bureaucracy, and the discouragement of initiative. The controlling staff would then be a co-ordinating body rather than a governing autocracy, and this could be arranged to foster a healthy spirit of competition in efficiency between the various units or groups of the corporation. In other words, an amalgamation, to be successful, should be organized on the basis of what might be called centralized decentralization; the central administration formulating policy and co-ordinating its execution, while the individual groups or units will retain full responsibility for carrying out the approved policy.

There is another danger attached to large amalgamations: They may endeavour by means of their large resources to force out of business their smaller competitors by ruthlessly undercutting prices, knowing that their resources permit them to lose money on certain of their products for a sufficient length of time to enable them to eliminate the competitor who depends entirely upon the sale of these products. Though this may be legitimate competition, it is, unfortunately, likely to produce an atmosphere of hostility in the industry, and even outside, and may lead to a spirit of antagonism which may well stultify all further attempts to extend the schemes of rationalization.

The other method of rationalization, which has been mentioned under the title of association, is the system under which individual firms retain their separate identity, but co-operate in the formation of an association or co-ordinating body which will formulate the policy to which the whole industry will work.

This method may have advantages from the point of view of the British individualistic temperament. It obviates the dangers arising from an amalgamation with a top-heavy and ponderous administration, and leaves executive responsibility fully in the hands of the individual units. It requires, however, the existence of a powerful co-ordinating body in which the rest of the industry is prepared to put implicit trust, and the decisions of which the individual units will willingly and loyally carry out. There are obviously certain difficulties to be overcome regarding the pooling of research resources, the redistribution of production with its consequent financial adjustments, and the organization of co-ordinated arrangements for purchase and sale; but these should not be insuperable. This method of association would, however, present serious objections in practice if the number of individual firms was large. The best solution might be a combination of both methods. That is to say, the industry should amalgamate to form a small number of fairly large units which could then associate in the formulation and execution of a common policy. Such amalgamation should take place among firms manufacturing the same type of product, even if it means splitting up firms' activities to do so, in order that each of the new units will, as far as practicable, deal only with one branch of the industry. For example, dye firms should amalgamate with each other, and similarly the fine chemical firms. This should facilitate their subsequent co-operation. This method has been applied with great success in the Ruhr coalfields, where the actual mining industry is organized in a number of combines as far as ownership is concerned; for commercial and output regulation purposes it is constituted as a highly developed form of cartel or association of separate concerns, and this enables the industry to control production and prices in a manner which would otherwise only be possible by complete trustification or amalgamation.

PRESIDENTIAL ADDRESS

Of Fred S. Larkin, A.M.I.Mech.E., of the Gas Light and Coke Company.

[Before the London and Southern District Junior Gas Association, Oct. 25.]

In addressing you from the Presidential Chair, I feel that I do so under somewhat unusual conditions, as this is the first time your President has not been directly representative of either manufacture or distribution.

On Nov. 26, 1926, I had the pleasure of giving you some idea as to what progress had been made in gas appliance construction up to that time. Since then, however, further improvements have been made which are now being tried out on the district; and that, after all, is the all-important test as to whether an alteration is really an improvement or not. I now propose to review those observations, and, with the addition of a few remarks on one or two general items, hope to be able to interest you for the time at my disposal.

Vitreous Enamel Cooker.

With the advent of the vitreous enamel cooker, a brighter tone is given altogether to the cheerfulness of the kitchen, to say nothing of the ease of cleaning which an enamel surface such as this affords if properly looked after. Though the composition of the enamel is not altogether what we could wish, it is well worth putting on the market as a commercial article, and there is no doubt that in time an enamel will be evolved which will be acid resisting and which will not stain or chip, and an iron which is absolutely free from those impurities which account at present for small bare surfaces where the enamel will not take properly. Important as the composition of the iron has been, in order to get the fine surface for stove enamelling, it is nothing compared with that purity which is required for vitreous enamel to take properly.

From the point of view of the manager of a stove repairing shop, the advent of the enamel cooker gives rise to serious thought as to the future, if hire is contemplated. When the ordinary finished cooker is received back from the district, it can be cleaned by any of the present methods, re-painted, and turned out equal to new. With the vitreous enamel cooker, however, it is a different matter. An enamelled surface which has become discoloured by products, or the glossy surface removed by acids from fruit, &c., is not going to be accepted by a consumer who has seen the perfect article exhibited in the local showroom.

The stained portion must be scrapped and a new part obtained from the maker. Here again trouble is experienced, as, the enamelling having been done by hand, the new and old parts do not match in a number of cases. The human element always has to be allowed for, and, though the article is as near standard as possible, variation in the shade of different parts of the same cooker is very noticeable. The makers realize that they have not got the perfect enamel yet, but they are doing all they can to give us the best match that is commercially possible.

Mottle Enamel and Self Colours.

Though in this country the mottle enamel has been accepted generally as a standard, it may be that this is only the first step towards self colours in various shades which will be asked for by the consumer. Generally speaking, the Colonial trade will have none of our mottle finish—which was selected as the one which would show stains and discoloration least—but demands self colour in various shades which remind one rather of a kaleidoscope when they are seen together in a showroom. It has, however, the advantage of being more easily matched when another part is required, provided the makers are working to a definite standard in colour.

The old question as to whether it is better to sell outright or on hire-purchase terms, or to hire, still seems to provide ample scope for argument. When the modern cooker and gas fire were evolved, those in favour of hire said at once "where would we be now if it was not possible to scrap all the obsolete appliances as they come in and replace with up-to-date ones;" the old appliances have repaid the capital expended, and therefore can be relegated to the scrap heap without compunction.

I think it is generally accepted now by the profession that no very big advance can be expected in the efficiency of gas fires and cookers, and therefore sale and hire-purchase, when considered from the view of obsolete appliances, have not the same drawbacks. There is, however, another aspect of the case which is equally important, and tells heavily on the side of hire; and that is advertisement.

The majority of companies who let "on hire" have a maintenance scheme in connection with it, and this has the effect of keeping the cooker, fire, or radiator in a satisfactory condition, whereas, if the appliance was sold or hire-purchased, it would be in whatever condition the owner allowed it to get into; and this, we know from our experience, is often very unsatisfactory. Can there be any worse advertisement for our appliances than to see them in a dirty neglected condition? The careless consumer is always ready to blame the appliance, or to refer in disparaging terms to the quality of the gas supply.

Hire may be responsible for a large invested capital, but, provided hire rents are carefully thought out beforehand, and one or two inspections per annum are allowed for, it should be one of our best investments, as we are known by results; and what is a better advertisement than a bright cheerful gas fire on a cold morning—or what worse than one badly adjusted with broken fuel aggravating bad regulation?

Cooker Construction.

On the cooker hotplate, owing to experience gained in the last few years, there appears to be a marked tendency to return to the drilled ring burner with some of the makers who at one time issued the spreading flame burner only. In the four-burner hotplate you now frequently find two spreading-flame and two drilled-ring burners; and, from what I can hear, the ring burners do the greater part of the work.

[Photo. by Elliott & Fry, Ltd.

THE PRESIDENT,

Frederick Stanley Larkin, A.M.I.Mech.E.

Mr. Larkin is the eldest son of the late Dr. F. G. Larkin, F.R.C.S., L.R.C.P., of 44, Trinity Square, Borough, S.E., and Grove Park, Kent. He was born in 1875, and was educated at St. Olave's Grammar School, Southwark, S.E. From 1893 to 1898 he was with Messrs. Wood and Ledward, Agricultural and Condensing Engineers, and he received technical mechanical engineering training under Prof. W. J. Lineham, Goldsmiths' Institute, New Cross. After a short period as draughtsman with Messrs. The Bryan Donkin Co., Bermondsey, he was appointed Assistant Mechanical Engineer to the Gas Light and Coke Company, Beckton Works. In 1902, Mr. Larkin was elected an Associate Member of the Institution of Mechanical Engineers, and in the following year he commenced technical training in Gas Manufacture at the Polytechnic, Regent Street, W., and became a Polytechnic Medallist in Advanced Gas Manufacture. He was appointed Local Manager of the Stove and Meter Works, Fulham, of the Gas Light and Coke Company, in 1908, and in 1929 became Manager.

Bottom-flue outlets on cookers with some of the makers still seem to be the order of the day, but there remains a good demand for top-flue outlets. Condensation in cookers with bottom-flue outlets being very troublesome, in some makes catch trays are provided to prevent it running down to the floor. It is more or less a repetition of the old Giles cooker, which was in use between fifty and sixty years ago, when it was combined with the "no gas in the oven" bogey.

At first we were told by the makers that the construction

gave us the "essential" even heating throughout the oven, but now we find that a "cold zone" has been evolved to meet the demands of the cook who prefers to have different temperatures to accommodate her operation. The controversy as to whether it is better to have one or two burners in the oven still continues, but, as consumers seem satisfied with either one or the other, it does not appear to be a vital question except to the advocates of each method.

One of the most difficult things from the gas undertaking's point of view is to keep the balance between progress and conservatism. Real progress is to be advocated and pushed for all it is worth; but where a new model is offered, where there is no appreciable increase in efficiency or utility, except in the mind of the salesman, the manager has always to carry in mind the large number of parts which must be added to the spare material stores, which, do what you will, persist in growing at an alarming rate, as existing parts must still be stocked for all the older cookers, a number of which will remain on the district for many years to come.

Standardization in construction is to be advocated in all cases if it can be brought into operation without adversely affecting the consumer's interests. How beneficial this has been in gas fire construction is admitted on all hands, but when it comes to standardizing the hotplate burners and bars, on account of economy in manufacture, surely it is a different matter.

Time Factor in Cooking Operations.

It is of little consolation to the user, when she is in a hurry to boil a kettle of water, that she has three or more available hotplate burners all rated at the same low consumption. Efficiency is a thing the consumer knows very little about, and within a reasonable range is not the vital factor. The time factor, however, is of the utmost importance, and, in the majority of cases, would be the deciding factor in choosing a stove if the salesman said "that the burner on this stove takes five minutes to boil a quart of water, while this one takes seven minutes, but is slightly more efficient."

It is to be regretted that economy in works costs has been allowed to interfere with the elasticity of the hotplate burners, for it is just as essential that one or two should be powerful burners for quick boiling as it is that there should be one or more low-consumption burners for simmering, &c. Though in some cases, at the price of current charged, the electric cooker costs no more for the oven operation, if we provide burners on the gas cooker hotplate capable of boiling in a short time, with reasonable efficiency, we shall see more electric cookers sent home than are being returned at present, for it is the slowness of the electrical hotplate which is so annoying to the consumer who has previously used gas. With the keenness of electrical competition—which we are really only just beginning to feel—this very important aspect of the matter merits the serious attention of gas stove makers.

The gas company hold, as it were, a watching brief on behalf of the consumer, and would not allow an inefficient cooker to be issued; and so long as they know from their tests that the burner is really efficient, will encourage rather than discourage increased burner consumption, because, in so doing, they know that they are giving real service to the consumer.

With radiators considerable progress has been made during the last year or two. Incidentally, I wonder who first used the term "radiator" for this class of apparatus—surely "convector" is the only name which can be regarded as correct, as the actual radiation is a very small percentage of the form of heat delivered. No one will be sorry to see the passing of the old gas-steam radiators. Why it was ever considered necessary to introduce the medium of water in an appliance which gave 100 p.ct. efficiency, it is difficult now to understand.

The gradual change from the bunsen and Argand burner to the flat-flame burner in radiators is to be strongly advocated on the grounds that conditions are less likely to arise to affect the proper combustion of the gas. The bunsen flame, though highly satisfactory on the hotplate, where a near approach to flame contact is desirable on the grounds of efficiency, has little to recommend it in any other situation, owing to the fact that complete combustion can only be approximated under constant quality, density, and pressure conditions. The Argand is much better, but it only requires a small particle of dust in some form or another to drop on it, or the steatite head to become cracked, to alter the whole form of the flame, with consequent effect on combustion. With the flat flame, unless the particle of dirt is too heavy, there is velocity enough in the efflux of the burning mixture to blow it away, and it accommodates itself to varying pressures, &c., in a much more satisfactory way as far as combustion is concerned.

Shall we see flat-flame burners back in the ordinary domestic oven again? It would not surprise me if one of our leading makers, approaching the delicate question of complete combustion in the oven, designed a cooker in which the burner was protected from fat splashing, &c., in such a manner as to allow it to be used without loss of efficiency, and with the claim that combustion in that particular oven was more perfect than in that of other makers. It does not appear to have insuperable difficulties now that oven construction is coming in for a share of the attention previously only given to the hotplate in most cases.

Water Heating.

Water heating, both in geyser and boiler construction, has received considerable attention; mistakes have been eliminated and new ideas put to the test of practical experience. Notable among these is the slow-combustion water heater, which requires no flue in fixing, owing to the small consumption—a great advantage where fixing costs are a big consideration. It also has the advantage that the consumer, with people in the house who are careless in the use of gas, cannot waste even if they want to. It remains to be seen, therefore, whether an apparatus of this description, in which the control is out of the user's hands, will meet the demand of a large section of the public, and whether, if there is an actual reduction in the gas bill, it will be sufficient to compensate for this drawback. One of the chief arguments we have always used in connection with the installation of gas heated apparatus is that heat in any form can be had when required, and we must therefore leave it to the judgment of the public, who are, after all, the final arbiters in these matters.

Of water heaters generally, nothing but good can be said, provided the user takes reasonable care not to waste gas; but, even with thermostatic control, the thoughtlessness of leaving the gas on—even if hot water will not be required for hours—is responsible, I am quite sure, for a number of unsatisfactory cases of high consumption.

In giving general satisfaction in use, the geyser—from the point of view of efficiency and quick service—will, I think, continue to hold its own. The makers have not been slow to take advantage of any real improvement, and the combining of the swing-out burner for ease of maintenance, with the interchangeable right and left hand connections, so that the pilot, where used, is always to the front, have done much to popularize further a most useful article. This latter improvement has also resulted in reducing the number it is necessary to hold in stock. Should an opposite hand machine be required, only a few minutes are taken up in making the change over—a big feature from the stores point of view.

In view of the improvements which have been made in gas burning appliances during the last few years, the responsibility of any gas company who re-issue for further service any cooker, fire, heater, &c., which they know to be obsolete or inefficient is a serious one. By doing so, they are allowing our competitors to instal a piece of apparatus which they can justly claim is more efficient or satisfactory in use than the one removed; this they would not have done, in all probability, if the appliance had been reasonably efficient. It makes a vast difference whether comparison is made with an obsolete or an up-to-date appliance. The consumer, in a large number of cases, looks on his cooker, fire, or heater, having been issued to him by his local gas company, as being the best that can be offered for his purpose. If this is an inefficient appliance, it gives every opportunity for a comparison, unfavourable to the gas company, with some other method of cooking, heating, or lighting, with the result that the gas apparatus is taken out and something else installed.

This leads to very unsatisfactory results from our point of view, as the consumer, being satisfied with the result of the change, becomes a living advertisement for our opponent, and soon converts his friends to the same state of mind. The policy of ruthlessly scrapping appliances which are out of date is the only method of successfully resisting this encroachment on the field of gas. Why hesitate? When manufactured, apparatus of this class was up-to-date and, as such, laid the foundation for the favourable reception by the general public of gas as a heating agent. They have served their purpose, however, and can now be relegated to the scrap heap, having well repaid the money originally spent on them.

"It pays to advertise" is as true to-day as it ever was, and this is one of our best forms of advertisement—"New and efficient goods for old and obsolete ones." In the last seven years we have scrapped 214,359 appliances to a value of £708,053, and last February a further scrapping scheme was approved by the Directors, which will ultimately result in the taking out of service another 65,962 appliances to a value of about £213,839. Every year a consultation is held by those responsible for recommending further scrapping, if necessary, and proposals are put forward for the consideration of the General Manager with regard to certain classes of appliances which it is considered do not justify renovation. Once the approval of the Directors is obtained, the stove goes under the hammer.

A National Laboratory.

It has been suggested on several occasions in communications to the Technical Press that an authority such as the National Gas Council should issue a certificate that a certain appliance does actually give the result claimed for it. This would, in a way, be a "hall mark" that it had the approval of the authorities, and that such an appliance was up to the requirements of the certifying body as to safety and efficiency.

The proposition is sound in theory, and would be to the general good of the industry if practical; but it would necessi-

tate setting up a laboratory where impartial tests could be carried out, and to which all makers could send their appliances in order to obtain the necessary certification. The expense would be very great, and the special conditions under which the maker might ask for his appliance to be tested would, in all probability, nullify the value of the certificate given.

There is, perhaps, a more simple way in which such an authority could benefit the industry generally, and that is by bringing pressure to bear on advertisers to keep their notices within a reasonable measure of truth. This occurred to me a few weeks ago when I happened to see a geyser advertised which claimed to save more than half the gas used by the geysers in general use. Those who know anything at all of geyser efficiency know how impossible it would be to substantiate such a statement. How misleading it is, however, to the general public. On the strength of such an advertisement a geyser is installed, with all the cost of fitting, only to result in disappointment to the consumer, who in all probability blames the quality of the gas for the failure to obtain the result promised.

Fulham Stove Works.

In March next you are paying a visit to the Fulham Stove Works, of which I am Manager. That being the case, it may not be out of place to give you a few details as to our work there on stove renovation. The works were originally built in 1895, but, after several temporary extensions, it was found necessary entirely to reconstruct them, until to-day we have one of the largest and most up-to-date stove renovation works in existence, employing 360 hands and having an area of 2½ acres. During the year 1928, we issued to the district 91,285 appliances, of which 55,293 had been renovated in the shops. Our largest daily delivery was in October, 1926, when no fewer than 916 were sent out, employing 14 motors and 28 horse vans, which at the same time brought in for renovation a large number from the district offices.

As the appliances are received back from the district, if they are not wanted immediately for some order received, they are passed into the old stove stores. When required, they are taken into the stripping room, where wooden knobs, brass parts, or anything which could be affected by the heat of the muffle, are removed, and cleaned off in boiling vats containing soda and soap powder. The cookers are then passed into a gas-fired muffle in batches of from six to sixteen, according to size, where they remain for about ¾-hour at a temperature of 900° Fahr. They are then allowed to cool down, and pass into the sand blast plant.

In this plant they are put in a cubicle on a revolving table, and are subjected to the sweeping action of a large volume of sand under air pressure, which has a brushing effect and cleans all dirt away from the metal, leaving it as good as new. The stove is then taken into the main repairing shop, where it was stripped down, and built up again with new slag wool, if necessary; all joints are secured, cocks ground in and greased, and finally the cooker is painted ready for re-issue.

In order to make sure there is no defect, before the cooker leaves the fitter's bench it is tested by one of the stove provers. After this, it is passed through a travelling stove muffle, where it remains at a temperature of about 250° Fahr. for ½-hour, in order to drive off the majority of those fumes which are so objectionable when a newly painted stove is first lighted up. It then goes into the stove stores for re-issue.

In the case of automatic cookers the same process is gone through with regard to stripping and sand blasting, but in the repair shop they are dealt with by a semi-process method by lads of from 17 to 20 years of age, under the supervision of a skilled fitter. The painting of these cookers is done by means of the spray method, which is quicker and more satisfactory than hand work. The same process of stoving as with ordinary cookers proceeds, and they are then put into stock for re-issue.

Fires are dealt with in a similar manner, except that, instead of sand blasting, the old enamel is boiled off in strong pickled solution. At present we are stoving these with an ordinary enamel, but hope shortly to have an air drying enamel in use which will give equally satisfactory results.

Only minor repairs are dealt with as far as geysers are concerned, the Company having a contract with the makers to renew entirely the inside of a geyser should it fail after twelve months' use, it being found generally unsatisfactory to patch a geyser boiler, as usually, when one place becomes defective, another soon follows it. Geysers—new and repaired—are under guarantee for twelve months.

Virtues of Radiant Heat.

Attempts are being made in various directions to get much better results from convected heat by means of different methods of distributing the warmed air. This may be all right in certain circumstances, but it is doubtful whether any direct method of domestic heating, other than radiation, can be regarded as really satisfactory. There is a vast difference in the atmosphere of a room in which central heating is the medium, as compared with that of a room in which a modern gas fire is properly fixed. True, the air in a room is not heated directly by radiation, but it does become comfortably warm by the low-temperature convection currents set up by the heating-up, by radiation, of the various articles of furniture. The argument is used—and rightly—that continuous gas fire heating is expensive, but are we sure that it is not as cheap in the long run, if we take into consideration the necessity for the more frequent re-decoration which must be done if central heating is employed? I recently have had experience of this, and have come to the conclusion that, if you are going to depart from the coal fire—on the grounds of pollution of the atmosphere—then, unless you can get a satisfactory type of coke fire, in which the bulk of the heat is radiant, for domestic use the only good alternative is, use gas and pay the bill each quarter.

In a new house, electrically lighted, which I have only inhabited for one-and-a-half winters, it has been necessary to whitewash the hall ceiling, and even in one of the bedrooms upstairs all the rafters are showing in the ceiling, where the area between them has acted as a filter and arrested the passage of the fine particles of dust. As the warmed air cannot pass through the plaster where the rafter is above, there is no collection of dust, and the rafter shows as a lighter line on the ceiling. During the half-winter of 1928, I felt that the benefit of coming into a nicely warmed hall, and having the chill taken off the whole of the house, was well worth the expense of installing radiators, but I had not then banked the fire up at night. During last winter, however, the fire was kept in almost continuously night and day, and I soon found that the discoloration which was taking place on walls and ceilings was going to be a serious drawback to the central heating idea.

I wondered at the time whether the water temperature had been kept too high, but on visiting a friend's house where the whole house was installed throughout with a heating system, where the radiators were fixed below the windows and never got abnormally hot, I found that precisely the same results obtained. In this latter house the rooms were light and airy, so the trouble could not be due to a ceiling of too low a pitch. When you have an experience of this sort yourself, it makes you examine with a critical eye the decorations of friends' houses when you know that hot water heating is employed, and, from what I have seen, I am convinced that radiant heat is not very much more expensive, when you take into consideration the upsetting of the house generally when decorations have to be renewed. You cannot get convection currents which do not carry with them the fine particles of dust present in the atmosphere. These particles impinge on the first surface with which they come in contact as they are carried by the changing air currents in a room.

The Open Coke Fire.

When it comes to the question of economical domestic heating, I think there is going to be a big future for the modern coke fire. I do not refer to that class of coke fire where a large expanse of cast iron sets up convection currents which have exactly the same results as hot water heating, but rather to that class in which a good proportion of the heat is radiant, and only a small amount convected.

What is the radiant efficiency of a coke fire? Is there any recent test, which can be referred to as being really definite, of an ordinary coke and low-temperature coke, which can be regarded as a commercial standard with which other cokes could be compared?

In the Fuel Number of "The Times" on Dec. 1, 1913, Prof. Lewes is quoted as giving 19 p.ct. for the coal fire, and 44 p.ct. for the coke fire. This seems a remarkable figure, and one which it would be very dangerous to quote without knowledge as to the conditions under which the tests were carried out. Unfortunately, Prof. Lewes died in 1915, and it is therefore impossible to follow the matter up.

In "Coke and its Uses" Mr. Nicol quotes Dr. Margaret Fishenden—whom we all regard as an authority on the subject—as giving 20 to 24 p.ct. for the coal fire, and with dry coke 28 p.ct. This, however, rapidly diminishes if wet coke is used. In "House Heating" the same authority quotes coal as 17·5 to 25 p.ct., gas coke 24·5 p.ct., and low-temperature coke as 30 to 34 p.ct.

It may be that, in Prof. Lewes' test, some special form of low-temperature coke was used; hence the high results obtained—otherwise it does not seem possible to reconcile the reports received from two such noted scientists. It is to be hoped that with the rapidly increasing demand for a domestic coke, some more definite information on the subject will soon be available.

During last winter, I tried several coke fires in my private office, so that I could personally observe how they behaved in actual use. One of those tried was more like the modern gas fire in appearance, and could be fitted back under the coal grate canopy in the usual way; the only difference in appearance being that there was a slightly greater depth from back to front. Gas was employed to light it, and, with dry coke, the fire was well alight in twenty minutes. A movable front canopy prevented any escape of the initial products into the room, and in 45 minutes a thoroughly bright fire was

burning. Should the chimney be somewhat sluggish, this canopy can be adjusted to minimize that trouble, while a back flue controlled by a damper pulled the fire up quickly if it had been allowed to get somewhat too low.

On a series of tests during the coldest weather, this fire was all that was required in a room of 5000 c.ft. capacity and a good high pitch. The average cost of fuel burned worked out at 2½d. per day of 10 hours, with coke at 30s. per ton.

This brings me now to what I consider is a very important point with regard to coke fires. Until recently, it has been the practice to construct a coke fire for use principally in heating places such as halls, club rooms, or any similar places where ventilating is very free; when, however, we apply the coke fire to the ordinary living-room, different conditions exist, and the ample ventilation of the room and the absence of products of combustion are of the utmost importance.

I do not think we shall be exceeding the limit of ordinary precaution if we insist that all coke fires designed to be used in living rooms shall pass the same test as the gas fire—viz., that they should pass all the products through the canopy when standing in the open, and fitted with just enough flue pipe—(say) 2 ft.—to ensure the products being delivered into the base of the chimney. Some people seem to be under the impression that a coke fire is a cure for down-draught. This, as you know, is not a fact, and must be contradicted on every possible occasion.

Some of our colleagues seem afraid of the competition of the coke fire, being under the impression that it will reduce gas consumption. I do not think there is any fear of this. As a matter of fact, I am inclined to take the opposite view, and assert that increased gas sales will result. With the coke fire or the coal fire, there must be a certain amount of dust in the room after a day's use, and those people who use gas fires with the idea of labour saving will not change to the coke fire for this reason.

Though the coke fire is cheaper, it does not appeal to this class of consumer, as labour saving is the essential point. On the other hand, we have, I am sure, many thousands of consumers, both ordinary and prepayment, to whom cost is the main consideration. These people would not dream of using a gas fire, owing to the expense, but would willingly hire a coke fire and use it to our mutual advantage. Each time the coke fire is lighted, on an average 10 c.ft. of gas are consumed. Here you have a gas consumption which may well become a substantial one, and amply compensate for those few cases where the coke fire supersedes the gas fire.

Again, though we are primarily interested, through long connection, with the sale of gas, we must always keep before us that it is only by getting the best price for all residuals that the cost of gas can be kept down. If, therefore, by the introduction of a satisfactory domestic coke fire, we can create a big demand for our coke, there will be no necessity to ship vast amounts away to the Continent.

The screening and grading of coke which are now becoming fairly general should do much to popularize this fuel, as a suitable size for any work can be obtained. The excellent efforts which are being made to popularize coke as a fuel in the Provinces are meeting with good results, and the idea of the "empty coke yard" should be sufficient to make other managers look round and see whether some slight variations, if necessary, in these schemes would not stand a good chance of success in their own locality.

The fuel resulting from low-temperature carbonization has been tried in various places, and seems to give general satisfaction. The output next season will be carefully watched by those interested, and should result in a fuel that can easily be burned in the ordinary coal-grate, and may be successful in weaning the consumer from polluting the atmosphere by the emission of smoke from ordinary coal fires.

In the "Gas Salesman" for March 27 last, during a discussion, one speaker was anxious as to what would become of coke sales if gas were pushed in cases which he had in view—viz., bakers' ovens. Surely it should be pushed for this purpose, for these are cases where temperature control is absolutely essential, and there is no getting away from the fact that with the modern industrial gas appliance, temperature can be regulated and varied to a nicety. How can the oven heated by coke expect to compete in the end with such conditions? Let us consider in every case which of our products is going to give real satisfaction to the consumer, and we shall be doing a real service to him, and to the industry at the same time.

Education Scheme.

You have been very pleased, I am sure, to see that the Council have approved in principle the proposals of the Southern Association, with regard to the Education Scheme. As one of your representatives on the Committee, I have taken a keen interest in the arguments for and against a revision of the Rules originally laid down. The case of the isolated student has been the greatest difficulty to overcome, and it is a matter for congratulation that the actual experience of working of the original Rules has supplied the information which has convinced those in authority to reconsider the situation. The Council have been criticized in that they did not move earlier in the matter, but they had to be really satisfied that the complaint was actually general before they decided to depart from their original attitude in the matter. Any suspicion that a student could be successful by a "cramming" course is safeguarded by the *viva-voce* examination which has now been decided on under Section II.

I have always taken a keen interest in the advancement of the younger members of the industry by means of education schemes, and have for some years now done what I could in a small way to lay the foundation of it at the Works at Fulham, where about 60 lads are passing through the initial stages. I need hardly say that this scheme has the strong support of the Governor and Directors, and now arrangements have been sanctioned by the General Manager by which we shall be working in close co-operation with the Gas Sales Department and help each other in raising the value of the future employee, and at the same time remove the "blind alley" which previously existed at the works.

The lads training under this scheme are called "trainees" to distinguish them from the indentured apprentices of the Gas Sales Department. They are recruited locally on leaving school or are transferred from the Gas Sales Department at Watson House after about twelve months of testing brasswork, and have to pass a rudimentary examination in writing, composition, and arithmetic to make sure they have the necessary groundwork of education to enable them to take advantage of the opportunities offered. They also sign a form that they are willing to attend at least two evening classes per week during the course of training. In return, the Company undertake to pay their extra travelling expenses to and from class; and, in the event of their making 80 p.ct. of attendances and sitting for the examination (unless unable to do so through illness or the Company's work), will return to them the class and examination fees paid.

On starting work in the shop they are put on cleaning fires as being the lightest work available. The fires are stripped, cleaned, put together again, and re-adjusted under the supervision of a capable fitter, who must combine with an expert knowledge of fire adjustment a real interest in the lads of whom he is in charge, and be capable of controlling them in a suitable manner.

After about twelve months on this work they are transferred to prepayment cooker work. This is done by semi-process work, and they take their turn at stripping, erecting, float making, testing, &c. They remain at this occupation for about two years, and are then put on ordinary cookers, boilers, radiators, small geyser repairs, &c., so that by the time they are about 20 years of age they have had a good all-round experience in the renovation of all appliances with which they are likely to come in contact on the district, to which they are then transferred as mates.

During the time they are with me at Fulham they attend evening classes arranged by the Education Authorities at a local Continuation School, where for two years they are further instructed in composition, writing, mathematics, and elementary machine drawing; and at the end of that time they sit for the Royal Society of Arts Examination. They are then sent to the Westminster Technical Institute, where they are instructed in Gas Supply and Gasfitting, attending both the theoretical and practical classes. With such a thorough groundwork, a year or two as mate with a really good district fitter is sufficient to turn them out as good fitters themselves.

Even when transferred to the district their technical education is followed up, and they are encouraged to continue with a view to qualifying for promotion as assistant foremen or foremen as the opportunities arise. Out of such a large number of lads there are, of course, several who are not capable of rising above the position of a good-class fitter; but we have the satisfaction of knowing that each one has had his chance if he has the ability and will to succeed.

Co-Partnership.

Co-partnership among gas companies continues to extend, and cannot do other than good to our industry. During last July, I had the pleasure of being one of the representatives of the Gas Light and Coke Company at the Week-End Conference on Co-Partnership in Industry held at Somerville College, Oxford. This conference was not only for gas companies, but for industry generally; and it was most interesting to hear the various forms in which co-partnership and profit sharing were being gradually accepted by companies, both public and private, who years ago would not have dreamed of letting their employees share, except in the way of commission, in the welfare of the undertaking.

Those advocating profit sharing—in which the share of the profits is handed over to the employee at the end of the financial year, without any stipulation as to how it should be used—were much in the minority; it being felt by the large majority that, if the true spirit of co-partnership is carried out, a proportion, at any rate, of the share handed over must be invested in the stock of the company to which the man belongs, in order that he may realize that he is a real partner in the concern which employs his labour. If a man spends his profit share in any other way, can he really be considered a co-

partner? He may invest his money in some outside company in which the interest obtained is slightly higher, but, if he does so, what interest has he in the ultimate progress of the company for which he works, other than the weekly pay-day and annual share out?

One of the main ideas of co-partnership, as I see it, is to help a man to save with a view to having when he retires either a substantial lump sum to help him to set up in business on his own account, or, if he prefers it, a regular dividend coming in which increases his pension to just that amount which makes all the difference between existence and real comfort in old age.

Should he be a married man, he has the satisfaction of knowing that, though his pension from the Company will cease at his death, he will still be able to leave his wife, should she outlive him, just that amount which will allow her to feel she is not really penniless when the pension ceases. On the other hand, if he so desires, he can sell his stock and enjoy the use of the money himself.

As I sign on employees, from time to time, as co-partners under our scheme, I always take the advantage of talking to them on these matters, pointing out that if they will only let their dividends remain in, small though they may be at first, they will gradually accumulate to an extent which is really surprising. Some of the men who took my advice in the matter years ago are now in the happy position of having a substantial amount of money to their account, with the knowledge that, should a really rainy day come along when money must come from somewhere, arrangements can generally be made for their accommodation.

PRESIDENTIAL ADDRESS

Of W. E. CROWLEY, of Newport.

[Before the Wales and Monmouthshire Junior Gas Association, Oct. 19.]

May I take this opportunity of acknowledging our indebtedness to Mr. Bell for his great services to the industry in the work he has rendered as a member of the Education Committee. Mr. Bell, I know, seeks no formal thanks, but he would, I am sure, be highly gratified if, as a result of his exposition of the Education Scheme of the Institution of Gas Engineers, many more of our members felt themselves in a position to undertake the course—a result which will, I trust, be his reward.

I should like also, in connection with the work of the present and future sessions, to remind our members that the Chartered Institution of Gas Engineers awards a Bronze Medal each year to the selected paper delivered by a member of the Junior Associations. We are grateful for this encouragement and also to the Wales and Monmouthshire Institution of Gas Engineers and Managers for the whole-hearted support we always receive and for the prizes distributed annually to our members. The object aimed at in the preparation of a paper is not the securing of reward; but, nevertheless, we fully appreciate our indebtedness to the donors of prizes and are rightly gratified in their acceptance.

It is the good fortune of our Association to possess a library in which I take particular interest, as it was during my tenure of the office of Secretary that this Institution took birth. It might not be altogether out of place to record its history. Mr. W. Cranfield at that time repeated to us an offer of a gift of volumes previously made to another District Junior Association, which had not been taken up. We immediately availed ourselves of the kind offer and this, with further gifts of volumes by Mr. Cranfield, Mr. H. D. Madden, Mr. J. H. Canning, Mr. T. A. Canning, Mr. Octavius Thomas, and Mr. J. E. Mogford, has placed us in possession of a useful selection of technical books which are at the disposal of our members.

UNFAIR LEGISLATION.

It is said that no electorate ever deliberately chose to be misgoverned, but on many occasions an electorate has declared for misgovernment unknowingly. It has made the wrong choice because it did not possess enough knowledge to make the right one. The same reasoning might aptly convey public condonance of the unfair limitations which we now find placed on the gas industry. British public opinion is against special privileges and the granting of monopolies, and, in viewing the favours showered upon the electrical industry by the State and the acceptance of actions by local authorities, which are inconsistent with what is right and proper, we may well ask, Is it fully realized that the gas industry provides regular employment for considerably over 100,000 men, as against less than half that number engaged in electricity supply; and that over 9 million consumers and four thousand trades use gas—the latter for an average of five processes of each trade; and that the capital invested reaches the huge total of some £180,000,000?

By way of comparison, it may be pointed out that the capital invested in the gas industry does not fall far short of the total capital of the coal mining industry. Living, as we do, in mining areas, might it not also be pointed out that gas-works are among the best of the home customers of the collieries, and, through the industry's purchases of coal, provide work for some 80,000 miners annually? Again, for comparison, it might be useful to bear in mind that for every collier employed in the supplying of coal to an electrical power station, more than two colliers are employed in producing coal for gas-works.

Some 70 p.ct. of the coal used for gas-works is railborne, and to this extent and in the handling of coke, tar, sulphate, &c., we furnish a far larger volume of employment on railways than our competitors. The mutuality of interests so far as the business man and shopkeeper are concerned are also strongly in favour of supporting any movement to secure to the gas industry no unwarranted interference in the carrying on of trade. So far as considerations of relief to ratepayers are concerned, figures prepared by Mr. G. Geen, the Chairman of the Company, early in 1928, show that, since the first accounts of Newport's Electricity Undertaking were published, the Newport Gas Company over the same period had contributed in rates approximately £40,000 more than had been paid both as rates and as contributions in relief of rates by the Electricity Department; and it is quite possible that similar statistics in other parts of the country would show a like result.

THE PRESIDENT,

W. E. Crowley, of Newport (Mon.).

Mr. Crowley has been a member of the Engineer and Manager's staff of the Newport (Mon.) Gas Company since 1903. He acted as Hon. Secretary of the Wales and Monmouthshire Junior Gas Association, 1924–26.

RATIONALIZATION WITHIN THE INDUSTRY.

By placing these facts before the public we shall be playing a part in helping to secure, at the earliest possible opportunity, legislation permitting rationalization within the industry and the bestowal of powers giving elasticity in methods of charge (such as are already enjoyed by our competitors) and of which the present narrow statutory provisions applying to gas are the negation. It is not my purpose to dwell in detail upon these points, but merely to acknowledge their existence and to in-

dicate lines upon which Juniors may assist in enlisting public opinion for the rectification of the evils which exist.

Signs are not wanting of an awakening to the tendency generally of central and local authorities to arrogate to themselves functions which do not properly belong to them, and the time appears opportune for the citation of actions of municipal authorities owning electricity supply undertakings in their unjust endeavours to restrict the use of gas.

Instances of illegal interference have arisen in various parts of the country, and I propose to give some information relating to our experience at Newport.

So far as the Borough of Newport is concerned, the capital expenditure on housing to March 31, 1929, amounts to £941,665. The subsidy, by means of Government grants and assistance from rates, for the twelve months ended at March 31 last, was no less than £55,698, and by far the greater portion of this sum fell due to be paid on account of houses built by the Corporation for letting. Under the guise of its powers as a landlord, strengthened, of course, by the existing shortage of houses, which is exercised as a means of coercing tenants to forego any scruples they may have, the Corporation have inserted the following clause in its letting agreement:

"The Tenant hereby agrees (*inter alia*): Not to use gas for the purpose of lighting the said premises."

It is surely a travesty of logic that, while Town Councillors who, from altruistic motives, are themselves precluded from participating in municipal contracts, can permit a department of the Corporation, of which they are the reputed Directors, to endeavour to create a monopoly for its own trading by the illegal exclusion of a feared rival. If local authorities permit the present conditions to continue they must lose all the respect gained by fair dealing as well as their position as the champions of public rights.

Now, it will be very illuminating to trace the history of this clause prohibiting gas for lighting in the letting agreement. As many of you will be aware, the Newport (Mon.) Gas Company successfully petitioned Parliament against the Newport Corporation Bill, 1925, and in the Minutes of Evidence taken before the Local Legislation Committee of the House of Commons on May 5, 1925, it is shown that the prohibition was dictated by the Electricity Committee of the Newport Corporation—"it being a distinct term of the agreement for the provision of electric mains on the Somerton Housing Estate that under no circumstances was gas to be permitted for lighting purposes." The considered judgment of the Parliamentary Committee before whom the case was heard was to the effect that no restrictions as to the form of light, heat, power, or energy can be imposed by the Newport Corporation. Every person is in the main and as a general rule the best judge of his own requirements, and, hence, legislation should aim at the removal of all those restrictions on the free action of an individual which are not necessary for securing the like freedom on the part of his neighbours. Notwithstanding powers and privileges conferred by Parliament, however, and the fact that in the building up of the national and local funds to which the Corporation has access for the relief of its liabilities, the Gas Company, through its trading services, are large contributors, the Local Authority, at the dictation of the Electricity Department, denies to its tenants the liberty of action to which they are entitled. The author of this restrictive covenant has evidently made a study of "Bossism" in American cities, whereby one Department of the municipality co-ordinated all the forces and impelled diverse Boards and Council Committees to act in unison at the dictates of a few designing individuals. It should, however, be remembered that the people of the United States, who have made more experiments in local government than any other nation, have long discarded this "Bossism," and, so far as gas and electricity are concerned, rational and economic methods, rather than the wasteful antagonism which we experience, are the general rule. The possession of electricity trading powers by local authorities was never intended by Parliament to vest in them the power to impose conditions upon any individual which would abrogate his rights under the general law. Present housing developments tend towards the extension of the policy of building by municipalities of houses to be let, and it is of paramount importance that steps be taken to safeguard the privileges of prospective tenants and also to remove restrictions so far as existing tenants are concerned, giving them the right to select either gas or electricity as a lighting agent. Other illuminants, such as oil and candles, are not only permitted on the Corporation Housing Estates but are being freely used, and it is a call for justice long overdue to seek the removal of the restriction upon gas. Municipal landlordism may be still further extended at no distant date as a result of the clearance of slum dwellings, and, should this anticipation be fulfilled, I have no doubt that careful watch will be maintained to secure that the rights of tenants of buildings substituting the cleared areas will be adequately secured against the creation of monopolies in favour of municipal electrical undertakings.

Existing Restrictions.

To return to the question of existing restrictions, still further instances of the domination of policy by the Electricity Department of the Newport Corporation can be given. So far as public lighting is concerned, all economic considerations are discarded, and no offer of the Gas Company for the lighting of streets where cables are laid will even receive consideration. To turn in another direction, it is universally admitted that no modern house is complete without a gas wash-boiler, which not only prevents pollution of the atmosphere, but is also sought after by the housewife as a means of eliminating drudgery. Practically every private builder is putting gas wash-boilers in houses erected to-day, but notwithstanding these facts and also that the enforcement of the provisions of the Public Health (Smoke Abatement) Act, 1926, rests with local authorities, the Newport Corporation, contrary at any rate to the spirit of that enactment, has decided that, in its latest Maesglas Housing Scheme, boilers burning solid fuel are to be installed. So far as economic considerations are concerned the installation of gas wash-boilers showed a considerable saving, and yet, such is the domination of the spirit antagonistic to gas, that, in the hope of securing an electrical monopoly in the houses, financial loss and the abandonment of amenities which are a great boon to the housewife were decided upon.

However, the tenants at Somerton, Maesglas, and other housing estates of the Corporation demanded gas, and have been furnished a full service for cooking, and the restriction against the extension of the service for other purposes cannot in justice be maintained. One would wish for the full publicity power of the Press in directing public opinion to the injustice of the present position. The suggestion may be thrown out that some action might be taken, possibly with the co-operation of workers in the industry at present outside technical organizations, to lay before members of Parliament and city and town councillors a statement of the position and the seeking of support to remedy present evils. It will be appreciated that this is distinctly a personal opinion which does not commit Junior Associations, but I am positive that if, in the furtherance of the objects desired to be achieved, they can serve any useful purpose—either along the lines indicated or in any other way—response to the call will be wholehearted and loyal.

In spite of "Municipian" theories and malpractices, it is a great tribute to the industry to record that the output of gas over the last twenty years has increased from 190,000 million c.ft. to 320,000 million c.ft. and that it continues to expand. Lighting claims the special attention of our rivals, and it is of interest to mention that in his recent book "Stage Lighting," Mr. Harold C. Ridge, the joint founder with Mr. Terence Gray of the Festival Theatre at Cambridge, said to be the oldest surviving theatre in the British Isles, states that some of the gas lighting, particularly by Irving, compared favourably with much of the electric lighting seen on the London stage to-day. He further remarks that it had one advantage over electricity; it was easy to alter the intensity of the light on the old stage, or a portion of it, by merely turning the gas taps on or off, whereas with electric lighting the dimming apparatus now in use is both elaborate and expensive. The stage demands the most intricate system, and I think we can accept Mr. Ridge's statement as a portent that the glamour of novelty surrounding electric lighting will become more mechanical and work fewer miracles as time goes on. To reap the advantage of the opportunities before us, every effort should be made to secure the highest efficiency and to arm ourselves to the fullest extent with the knowledge of the advantages of gas over electricity for lighting—in its reliability; in the preservation of eyesight; in the creation of ventilation by air movement; and in its hygienic properties by the sterilization of the atmosphere and as an auxiliary heating agent. We have the means and, given the will, can secure our lighting load. So far as fires and water heaters are concerned, research may be said to be continuous, and it is satisfactory to note the great improvements effected. A field with immense possibilities is also open for gaseous fuel for industrial purposes, while in the higher efficiency in retort house practice the industry is fully abreast of the times. For the future, we certainly expect, and there will be no quailing before, the strongest competition, but, in meeting that competition, we must discharge our responsibility in seeking the removal of the shackles at present hampering freedom.

Midland Association of Gas Engineers and Managers.—The Autumn Meeting, on Nov. 7, at 2.30 p.m., will be held at the Imperial Hotel, Temple Street, Birmingham, instead of the Grand Hotel.

Royal Sanitary Institute.—At an Examination for Smoke Inspectors, held at Nottingham, on Oct. 18 and 19, one candidate, Mr. John Hickey McAdam, of Newcastle-upon-Tyne, presented himself, satisfied the Examiners, and passed the Examination.

Cookery Demonstrations at Congleton.—Under the auspices of the Congleton Corporation Gas Department, an exhibition and cookery demonstrations were held at the Drill Hall during last week under the presidency of Alderman F. Jackson, J.P. (Chairman of the Gas Committee). The opening ceremony was carried out on Monday, Oct. 21, by Alderman I. Maskery, J.P. The demonstrations were given by Miss H. H. Tuxford, M.C.A.

GLIMPSES INTO THE PAST.

From the "JOURNAL" Eighty Years Ago.

Telegraph Wires in Gas Mains.

The electric telegraph is being adopted to communicate between the station of the Great Central Gas Company at Bow and the central office in the City of London. A copper wire coated with gutta percha is passed through the gas main, by which instantaneous communications can be made. At all times, but especially in foggy weather when the city is enveloped in dense fogs while the suburbs are clear, this ingenious application of the greatest invention of modern days must be of immense utility.

Soyer's Magic Stove.

We were invited a few days since to witness the operation of this well-puffed toy, by a friend who, (because of) the savoury flavour of some dish stated to have been cooked by it, had been induced to invest 35s. in the purchase of one of them. Nine pennyworth of spirits of wine were put into the lamp, which became exhausted in 42 minutes, just as ebullition had commenced in the quart of water upon which the experiment was tried. Our friend is now anxious to find a customer for the magic instrument, or will exchange it for a gas cooking-range, paying the difference in value.

A Plea for Amalgamation.

Our advertising columns bear conclusive evidence of the declining value of gas property, and more especially of that of the metropolitan companies. Holders are rushing into the market willing to sacrifice their shares at discounts from 8 to 10 p.ct. upon the sums paid up, terrified at the cry for "cheap gas," and foreboding nothing less than the entire destruction of their fortunes; and yet we see no cause for despair. The time is passed when with suicidal jealousy directors were busily cutting one another's throats by competition, and two companies would double their expenses and lower their prices out of mere spite. A more rational state of affairs now exists, and if shareholders, instead of taking alarm and sacrificing their property, would apply themselves to the removal of the petty jealousies which still interfere with the attainment of a closer union among the metropolitan gas proprietary, they would in our opinion still find their property valuable. . . . We shall not omit to point out to directors and shareholders in metropolitan gas companies, that their only resource for escaping destruction in detail is an amalgamation of their entire interests on an equitable basis.

When Coal was Cheap.

We understand that ships have been freighted at Newcastle for the London market at 5s. 1½d. per ton during the past month [*i.e.*, May, 1849]; a rate hitherto unheard of. Cargoes of coal have been sold as low as 11s. 6d. in the Pool.

On the Renting of Gasfittings.

It is a well-known fact that the profits of a gas company depend mainly upon the quantity of gas they manufacture and supply—the question of quantity being of far more importance than that of price. Quantity being admitted to be the point to be sought for and acquired, it becomes a matter for our consideration how to obtain this, and at the same time so as to have as large a supply as possible in the shortest distance. This brings the subject of the supply of gasfittings by companies at once to our view, as being a mode by which the principal obstacle to the use of gas by the public may be removed, by enabling them to obtain their gasfittings at a cheap rate, or on a rental. Upon the first introduction of gas lighting, the supply and fixing of the fittings necessary for its distribution and consumption was a matter not only imperfectly understood, but considered of so little importance as to be left in the hands of persons entirely unacquainted with their requirements, and certainly not in any way qualified to carry them out in a perfect or satisfactory manner; and even now very little attention is given by many gas companies to this most important branch of their business.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Thermal Value of the Electrical Unit.

SIR,—Notwithstanding the known inefficiency of the process—the conversion of raw coal into thermal energy as delivered to the consumers' appliances—electricity for heating is being used, advocated, and even forced upon people. Thus comparisons with other real fuels are of frequent occurrence, and the heat equivalent of the Board of Trade Unit of electricity becomes of importance.

As, however, there still seems to be a good deal of divergence in the figure used (3410 to 3420 B.Th.U.), I am seeking the courtesy of your columns and your help to plead once again for some uniformity in practice. It surely is of sufficient importance for there to be an agreed figure in use.

In 1923 the officials of the "B.C.G.A." interested themselves in this matter, and again on my representations in 1926 (see "Bulletin," April, 1923, and April, 1926). Reference was made to the Institution of Electrical Engineers, and it was understood that the figure used by the Institution was 3412 B.Th.U., which should be sufficient justification.

It is not a question whether or not this is a correct determination, or of using a low figure for the heating value of electricity, but simply a matter of uniformity. Cannot we all use 3412?

CHAS. F. BOTLEY,
Engineer and General Manager.

Hastings and St. Leonards Gas Company,
Queen's Road, Hastings,
Oct. 23, 1929.

The Value of the B.Th.U.

SIR,—You remark editorially on my address to the Scottish Junior Gas Association that "input governs the efficiency of a particular gas appliance" (*ante* p. 226). By consulting Appendix "B," the exact extent of such "governing" is found at various flue temperatures, and with different grades of town gas, under the heading "Percentage Gross C.V. Not Effectively Utilized." By deducting this percentage from the gross C.V., it is seen how misleading the conventional gross C.V. figure really is where an appliance has a high flue temperature.

Owing to the specific heat formulæ for the various gases at different temperatures being somewhat cumbersome, their inclusion in the address was not thought desirable.

R. D. KEILLOR.

Greenock Corporation Gas Department,
Oct. 24, 1929.

British Tar for British Roads.

SIR,—With regard to Mr. Thorne's letter on "British Tar for British Roads" (*ante* p. 250), I think there has been no better summing-up of the situation with regard to British tar for British roads published in any paper up to the time of writing, and I am of the opinion that this letter should form the basis of extensive propaganda.

I hope that your readers interested in the proposition will broadcast it to all and sundry, as there is no doubt that, coming from the quarter it has, a great deal of good is bound to accrue.

"MOTORIST."

Oct. 25, 1929.

"Bitumastic."

SIR,—We should be very grateful if, through the medium of your correspondence columns, you would permit us to bring to the notice of your readers a problem which we are up against, and which we are finding very difficult to overcome.

As you may know, we are the sole manufacturers of bituminous anti-corrosive materials which are marketed under the trade-mark "Bitumastic"—this name being registered throughout the world. Due to our publicity extending over the past forty years, the name has become so well known in shipping and engineering circles that the tendency to-day is to treat the name "bitumastic" as a general descriptive word in the same sense as the word bituminous is used, whereas the word "bitumastic" can be applied only to those materials manufactured by us at our works in England, France, Italy, and the United States of America.

Many instances have recently been brought to our notice where our trade-mark has been used indiscriminately by unauthorized persons, and up to now we have always accepted the plea that the word "Bitumastic" had been used in ignorance of the fact that it is our registered trade-mark. The practice, however, is becoming so widespread that in future, where cases are brought to our notice, we shall have seriously to consider more drastic action against offenders.

We should be very loth to go to extreme measures, but at the same time we canot afford our trade-mark to be misused after having built up the whole of our trading reputation on the word "Bitumastic."

W. H. DICK,
Managing Director.

Wailes Dove Bitumastic, Ltd.,
Collingwood Buildings,
Newcastle-on-Tyne,
Oct. 24, 1929.

MISCELLANEOUS NEWS.

GAS POISONING COMMITTEE.

[For earlier evidence, see "JOURNAL" for Oct. 16 and 23.]

The Committee which is inquiring into the question of gas poisoning, under the Chairmanship of Sir EVELYN CECIL, held two further meetings on Tuesday and Thursday, Oct. 22 and 24, at the offices of the Board of Trade.

Tuesday, Oct. 22.

Mr. *C. M. Dowse*, B.Sc. (Eng.), A.M.I.E.E., Chief Assistant in the Electrical Engineering Department, Northern Polytechnic, London, suggested that the confidence of the public would be stimulated by the formation of a representative body which should be able to organize and supervise research in connection with the elimination of danger associated with the supply of gas.

Prof. WHEELER asked witness if he thought the number of gas accidents was really important.

Witness said this, of course, was a personal matter. He did not see any more reason to be satisfied because a certain small number of people were killed by gas than that a small number of people were being killed by a certain disease.

Prof. WHEELER agreed that this was a perfectly proper point of view, but said that the fact that the number of cases of poisoning from coal gas was very small in proportion to the population or number of gas installations must be taken into consideration.

In reply to Prof. Wheeler's questions,

Witness said he was not aware that a great deal of work was being done in America, and had been carried out during the past ten years—which would be available in this country—with regard to adding some nauseous constituent to coal gas which would awaken a person.

Prof. WHEELER remarked that, if coal gas were made so absolutely nauseous that the slightest leak would make its presence known, it would mean a considerable overhauling of fittings throughout the country.

Witness: I agree; but I should not regard that as a disadvantage.

Prof. WHEELER said he liked the last statement in witness's evidence best, and took it that witness would agree that the confidence of the public would be stimulated if they saw that the gas undertakings were carrying out such research; or some committee was appointed by the gas undertakings.

Witness said he thought it probably would.

Mr. F. J. WROTTESLEY, K.C., pointed out to witness that a gas undertaking must not supply an odourless gas; the gas must have the distinctive smell of coal gas.

Witness replied that, if the percentage of carbon monoxide was increased, the characteristic smell of coal gas must be correspondingly decreased, because carbon monoxide itself was odourless.

Mr. WROTTESLEY: You are afraid that gas undertakings may evade that obligation

Witness said it seemed to him that, as the percentage of carbon monoxide in public gas supplies was increasing, the distinctive smell now must be considerably less than it was twenty years ago.

Mr. WROTTESLEY suggested that if gas was made particularly nasty in smell, it would restrict the sale of gas.

Thursday, Oct. 24.

Mr. *Frederick J. Cooke*, Civil Engineer and Architect, of Eastbourne, said that the South Eastern Society of Architects, of which he was a member, had decided to support the recommendations of a Sub-Committee appointed by that body which were made in consequence of the Holborn explosion and other gas accidents in various parts of the country, and, in particular, the disaster in Eastbourne in which five persons lost their lives. The Society had directed its inquiries specially with regard to discovering how gas that had escaped from fractured mains and leaking services found its way into houses and buildings generally. The Committee had come to the conclusion that it was practically impossible for escaping gas—whether from fractured mains or leaking services—to find a way upwards through modern roads and footpaths which were impermeable; it was therefore driven to the sides of roads, which might be garden ground, and paved forecourts extending up to the walls of houses, shops, or other buildings. He had personally studied the subject of gas services more than that of mainlaying, as he thought that the installation of the services in a proper manner was of vital importance to the public using gas. With regard to the mains, the gas companies and other undertakers were by no means entirely to blame in cases where there were defects. In many cases heavy vehicles passing over the mains inevitably would have an injurious effect on them; and he though that in some instances the pressure of the heavy traffic was driven down to the sub-soil.

He considered that there could be no doubt that the older mains were laid too close to the roadway; this was more or less common belief. He then put in a plan which he had prepared to illustrate a particular case in which he had been interested. It related to a house that had been "badly gassed." Removal of the garden soil close to the house wall disclosed the fact that the service pipe had rusted apart; it was only seven inches below the surface, and, owing to the soil being hard frozen, the gas "squirted" into the house to a very serious extent. The hole in the wall had been left unsealed by the gas company's men after they had inserted the service pipe.

"Deeply impressed by the obvious danger only too likely to result from such holes in outer walls, I considered it my duty to make extended inquiries on this head, and was credibly informed that it is a common practice," said the witness.

As there was no outlet for the escaping gas the house was flooded with it; and if such accidents could arise from rusty pipes, it was impossible to over-rate the danger to the public. In the present case he made inquiries, and found that other houses in the same road had been gassed in much the same way. All of them were terrace houses, and the pipes were necessarily taken through the front wall.

The CHAIRMAN: Was this really a common practice in that district?

Witness replied that the practice depended on whether the houses were detached or semi-detached. If they were terrace houses, there was no alternative to pushing the service pipes through the front wall—and in the present case they were inserted under the front windows.

The CHAIRMAN: I assume that your contention is that the pipes should be cemented round, and thus secured against allowing gas to escape into the houses?

Witness assented. He added that one drawback was that when a service pipe was put in from the main it was necessary to dig a trench in which to lay the service pipe. In the case where a main was fractured the trench allowed the escaping gas to travel along to the house—especially if the soil above the trench was well rammed. The peril in such a case was serious. In the instance he had mentioned the main was on the other side of the road, and the houses on that side were also badly gassed.

Replying to a question put by the Chairman, witness said he did not think that the escaping gas would percolate through brickwork unless the pressure was great. It had been the practice to build outer walls to houses, so that the walls were hollow. In such cases an escape of gas would be very dangerous, because the house would be almost flooded with gas. This was a remote case, he admitted, "but it is the remote things that happen."

The CHAIRMAN: The object of this Committee is to deal with normal cases; for the remote cases it might be difficult to find a remedy.

Witness said that in one case where a pipe had been put in, the hole was big enough for a rabbit to pass through.

The CHAIRMAN: Could not the fresh air also get in?

Witness: No; particularly during the frost. It is evident that where houses, specially in the poorer districts, have no forecourts and abut on to the backs of pavements the danger of gas poisoning is much greater owing to the consequent close proximity of the gas mains, especially where the houses are new, and the streets are narrow. Therefore, the poorer the district the greater the peril. He thought that all gas undertakings ought to have in their possession accurate plans of the positions of mains in all roads in which they were interested. He suggested that a set of by-laws should be framed to control the laying of gas mains and services in all public localities, and that they should be drawn up by a special committee composed of representatives of the Institution of Civil Engineers, the Institute of British Architects, and officials of the Ministry of Health or the Board of Trade. His main object in attending the present meeting was to advocate the formation of such by-laws.

The CHAIRMAN: By whom, do you suggest, should by-laws be administered?

Witness: I suggest that they should be administered in exactly the same way as building by-laws are administered. They are controlled by the Ministry of Health in the case of the builders; and gas mains by-laws could be controlled in the same manner.

The CHAIRMAN: Many municipalities are gas undertakers. How would the by-laws operate then?

That, said the witness, would furnish all the greater reason why there should be by-laws to control main-laying.

Replying to questions put by Mr. Wrottesley, Mr. Cooke said that in the Eastbourne case he had mentioned the service pipes had been cut off. So far as he knew there was no danger from leakage into the house. What was left of the service pipes would be plugged—but not plugged off the main; and that was his point.

Mr. WROTTESLEY: If the tenant decided to have gas again, he has a right to call on the gas undertaking to give him a supply?

Witness: Yes.

Mr. WROTTESLEY: Then, the pipes being already in the ground, he could be supplied at less expense than if the undertaking had to break up the road?

Witness: Yes.

Mr. WROTTESLEY: Who is to say that people are doing away with gas in their houses?

Witness: There is no chance of people wanting gas once they have discontinued it.

Mr. WROTTESLEY: That is your assumption.

We give on p. 331 the recommendations of the Sub-Committee of the

South Eastern Society of Architects, which were originally drawn up on March 18, 1929, and were redrafted in September, 1929.

(1) In future, all gas mains and connections to all buildings shall be laid under special by-laws and rigid inspection by the local authorities—such by-laws to be drawn up by the competent Government authority in conjunction with a joint Committee to be appointed respectively by the Institution of Civil Engineers and the Royal Institute of British Architects.

FURTHER SUGGESTIONS AND NOTES.

(2) All gas mains and connections, above a defined age—(say) fifty years—shall forthwith be critically examined, and re-laid when called upon by the local authority, if found faulty, as in the case of main sewers, and particularly house drains.
(3) Gas companies to be called upon to give evidence of the age of all mains and connections.
(4) That, if it be proved that more than two leaks have occurred in a particular length of gas main, then the gas company shall, on demand, uncover the whole, or a sufficient length of that main, at its own expense, and relay such faulty mains and connections, including making good roads and pavements.
(5) All connections in buildings up to gas meters to be tested periodically.
(6) Where there is a gas connection under the floors of any building leading up to the gas meter, there shall be a stop cock in a box outside such building, so that the gas can be cut off at will during emergencies, as, for instance, during a fire. The gas company shall not supply any gas to any building until the entire installation has been tested and certified as sound.
(7) Gas companies shall give immediate notice to the local authorities of any leak in any gas main or connection under their charge, and shall not cover up any faulty main or connection, after repairing it, until it has been seen by an inspector employed by any local authority.
(8) When an opening is made in any wall of any building through which a gas connection is put, such opening shall be hermetically sealed with Portland cement mortar.
(9) All gas connections inside buildings leading up to the meter from the mains in the road shall, wherever possible, be placed above the levels of the lowest floors and outside the plaster.

GASHOLDER SCHEME AT PADIHAM.

Board of Trade Inquiry.

Mr. JAMES F. RONCA, Director of Gas Administration to the Board of Trade, held an inquiry at the Council Offices, Padiham, on Tuesday, Oct. 22, into the application by the Padiham Urban District Council for a Special Order under section 10 of the Gas Regulation Act, 1920.

The proposed Special Order consisted of 33 clauses dealing with a number of provisions relative to gas undertakings. The Order also provided for the storage of gas on a plot of land at Sabden, which the Council have provisionally acquired.

Mr. P. WILLIAMS, Clerk to the Council, in opening the case, stated that the gas undertaking had been in existence since 1846, at which time it was in the hands of a private Company. The undertaking was acquired by the Local Authority in 1874. At that time the area of supply included Padiham and a portion of Hapton; in 1908, the parishes of Sabden, Read, and Simonstone were added, and, in 1911, the parish of Higham was added. He stated that in 1919 77,500,000 c.ft. were sold to 4163 consumers; in 1929, this had increased to 118,800,000 c.ft., with 4584 consumers, the quantity of gas used per consumer having increased during this period by 7700 c.ft. The main purposes of the Order, Mr. Williams stated, were to enable the Council to erect a gasholder on certain land at Sabden. Sabden was a village with a population of 1645, situated 2½ miles from the Council's gas-works. The present supply was by means of a 3-in. high-pressure steel main laid in 1909. Since that date the consumption of gas had increased approximately two-and-a-half times, with the result that many complaints were received as to inadequacy of pressure. The demand for gas in Sabden, which was far from being regular, fluctuated between very wide limits, and was at its greatest particularly on Sunday mornings. At these times it was no common thing for the pressure to fall from 4 in. to 1 in., and with the compressor working at full speed it was found impossible to maintain an adequate pressure. Faced with these facts, the Council considered what steps should be taken to effect an improvement in the supply. These were the laying of a new main and installation of additional compressing plant, and the erection of a district gasholder at Sabden. The latter scheme was chosen as being more likely adequately to meet the needs of the district by providing storage sufficient to meet the demand at any period; to give an even pressure at all times; and, in the event of any fault occurring on the mains, there would be sufficient storage for a period of twenty-four hours.

A considerable amount of time had been spent in investigating suitable sites, and it was only after very careful consideration had been given to the matter that the present one was chosen. The Council had made every effort to obtain the consents required to the erection of the holder, but they had been unable to do so, and it was then decided to seek the necessary powers by way of a Special Order. Within the limits of 300 yards of the site there were 272 dwelling houses, having a total rateable value of £2427. There were 282 occupiers and joint occupiers and 98 lessees and owners interested in these properties. Objections had been received from: The London Midland and Scottish Railway Company; the Burnley Rural District Council; the Sabden Baptist Church, the Sabden Parish Council; Messrs. James Stuttard & Sons, Ltd.; Mr. R. Jeffrey (on behalf of numerous local residents); Jane Birtwell; and Mr. H. T. Birtwell.

The first objection was withdrawn on the Council putting forward a protective clause. The Burnley Rural District Council, the Sabden Parish Council, and a certain number of local residents had withdrawn their objections after the Council had agreed to make certain reductions in the price of gas charged to Sabden consumers. There still remained, however, a number of objections, and these represented only a very small percentage of the total number of persons interested. The Council had actually obtained consents to the erection of the holder from 95 p.ct. of the occupiers and joint occupiers, and 78·7 p.ct. of the lessees and owners.

Mr. Williams then laid emphasis on the following points:

1. That it was absolutely essential that the supply to Sabden should be improved.
2. That the method of improving the supply now proposed was the best from a practical point of view and in the interests of the Sabden consumers.
3. That the erection of the holder would benefit the Sabden consumers financially, and also give them a better supply.
4. That these facts were recognized and appreciated by the Sabden people was shown by the large percentage of consents received, by the almost negligible number of objections which had been lodged, and by the withdrawal of the opposition of the Rural and Parish Councils.

Dealing with the separate objections, that of Messrs. J. Stuttard & Sons, Ltd., represented the most property. The firm in question were cotton spinners and manufacturers, owning works and dwelling houses within the 300 yards limit of the site. The objection appeared to be directed against the proximity of the site to the firm's works, and on the grounds that the erection of a holder might prove dangerous in the event of an explosion and that objectionable fumes would cause annoyance. It was pointed out that it was unnecessary to remind the Board of the absence of any danger due to explosion and with regard to smell. This was quite unfounded, as no works of manufacture would be conducted on the site, and, with proper care and management, no complaint would arise. Mr. Williams stated that it was difficult to argue that the placing of a holder adjacent to a cotton mill would be an objection. The firm in question having practically no use for gas, it would appear that a better supply would not concern them, but it would concern their workers and their tenants, all of the latter having consented to the site being used. Mr. Williams then proceeded to deal with the remaining objections on similar lines, and then dealt with the sites which had been suggested as alternatives.

Mr. *H. D. Robinson*, Gas Engineer to the Padiham Council, supported the statement made by the Clerk, and said that the supply to Sabden at peakload periods was very unsatisfactory, and he produced pressure charts showing the variations. He further stated that during the last two years they had lost practically the whole of the mill lighting, and, unless a better supply was given, were in danger of losing further consumers. Asked by Mr. Ronca as to his estimate for the holder and ancillary works, Mr. Robinson stated that it was approximately £3600, as against £4400 for the laying of new mains. Mr. Robinson stated that he had examined all the sites suggested, and was definitely of the opinion that the present one was the most suitable from an engineering point of view and preserving the amenities of the district.

Mr. *J. P. Mitchell*, Gas Engineer and Manager to the Blackburn Corporation, agreed with the Council's Gas Engineer, and said that in his opinion there was no danger either from explosion or smell. He had examined the various sites and agreed with the Council's Engineer in all that he had said.

The INSPECTOR then closed the inquiry and visited the sites.

Explosion at Kingston-on-Thames Gas-Works.—Shortly before 9 o'clock on Wednesday morning, Oct. 23, an explosion occurred in the water gas building. This was caused by the driving belt on the blower slipping, thus allowing gas from the generator to pass into the air-blast main. The Gas Company's employees promptly dealt with the flames resulting from the explosion. Three men who were in the building at the time suffered from shock and burns, but after treatment at the hospital they were allowed to go home. The roof of the building was blown off. The damage to the plant was slight, and it was again at work on Friday.

Uxbridge Stock Issue.—As will be seen from our advertisement pages, Messrs. A. & W. Richards, of 37, Walbrook, E.C., are offering for sale by tender, on behalf of the Directors of the Uxbridge, Maidenhead, Wycombe, and District Gas Company, £33,700 5 p.ct. perpetual debenture stock, at the minimum price of £90 per £100, yielding at that price £5 11s. 1d. p.ct., and also £20,000 ordinary stock, ranking for a standard dividend at the rate of 5 p.ct., subject to the sliding scale equally with existing similar stock now receiving 7 p.ct. Applications for this issue should be received not later than 11 o'clock a.m. on Tuesday, Nov. 5.

BRITISH ROAD TAR ASSOCIATION.

Arrangements for Exhibit at the Public Works, Roads, and Transport Exhibition, Nov. 18 to 23.

The British Road Tar Association will be represented at Stand No. 57, Main Hall, at this Exhibition, which will be held at the Royal Agricultural Hall from Nov. 18 to 23.

The Association's stand can be looked upon as being an information bureau, wherein all those interested in the use of tar will have an opportunity of discussing questions concerning its use and application for road-making. Samples of road tar, in accordance with the Association's Specifications, will be seen, and among the exhibits is an interesting section of Roman road, which, in contrast to the modern sections of tarred roads, will show the development that has taken place in road construction since the Roman period. The Association's tar viscosity demonstration apparatus will again be featured, which at a glance gives an indication of the desirable properties in tar for road making purposes. Literature on the tar treatment of roads will be available at the stand.

To itemize the advantages of British tar for modern road surfaces is no easy task. Special mention, however, must be made of the non-skid surface of the tarred road, a feature, in these days of alarming skidding accidents, which is essential for public safety. In view of the huge expenditure on roads at the present time, any economical form of maintenance is of importance. A real saving can be effected by the conservation of existing roads. The use of British tar has lengthened the life of thousands of miles of roads in Great Britain. It is easily applied with non-skilled labour under skilled supervision.

COKE OVEN SUPPLY FOR GLASGOW.

Examination by Expert Urged.

We learn from the "Glasgow Herald" that Councillor P. J. Dollan (Glasgow) has written to the Town Clerk appealing for a reconsideration of the project to enter into contract with the Gardner Colliery Company for gas supply. He proposes further inquiry, and suggests reference of the matter to an expert of the Fuel Research Board for report.

It is understood that Mr. Dollan's letter was considered by the Gas Committee at their meeting on Oct. 22, when a reply to his statements was submitted by Mr. John W. McLusky, General Manager of the Gas Department.

It was agreed to accept Mr. McLusky's report as satisfactory, and to circulate copies to the members of the Corporation. The Committee also decided to make recommendations regarding gasworkers who may be displaced from the municipal employment because of the Gardner scheme. These recommendations, it is understood, will have the effect of giving the workers a preference of re-employment in other Corporation departments, and also guaranteeing them against any financial loss in respect of their superannuation payments. These proposals will probably be submitted to the next meeting of the Town Council.

It is understood that it is the intention of the Gas Committee to proceed with the contract without re-submitting it to the Corporation, and that the legal agreement will be adjusted by the Special Committee, entrusted with full powers, and the Directors, under the supervision of the Town Clerk.

HONOUR FOR LEEDS GAS DEPARTMENT.

Three V.C.'s on the Staff.

Among the men who received the V.C. during the war, and who are to be entertained by the Prince of Wales, are three employees of the Leeds Gas Department. They are Private William Boynton Butler, Private W. Edwards, and Captain G. Sanders. They were born in the city, and won their medals when serving with Yorkshire Regiments.

Private Butler, who went to St. Oswald's School, in Hunslet, joined the 17th West Yorkshire Regiment (Bantams), and in France was in charge of a Stokes gun. With his colleagues in an emplacement, a fly lever of a Stokes shell flew off, and started the fuse. Without hesitation, William Butler picked up the shell, and hurried to the entrance of the emplacement with it in his arms.

Passing the emplacement, however, was a party of infantrymen. Butler, with the shell in his arms, shouted to them to hurry, and turned his back to them, his body between them and the shell. When they were clear, he hurled the shell on the parados, and threw himself into the bottom of the trench. It exploded immediately, and greatly damaged the trench, but hurt nobody. Undoubtedly his presence of mind and total disregard of himself saved the infantrymen and his colleagues of the gun team.

Private W. Edwards joined the 7th K.O.Y.L.I.'s. In an advance, his Company lost all its officers and was being swept by heavy rifle and machine gun fire. Private Edwards took command, and single-handed rushed from shell hole to shell hole towards a strong concrete machine gun fort.

He bombed the fort through the loopholes, took three officers and 30 men as prisoners, and signalled his Company to advance. Later he did very valuable and risky work as a runner, and guided his Battalion out over very difficult and dangerous ground.

Captain George Sanders was awarded the Victoria Cross on Sept. 9, 1916, for most conspicuous bravery.

After an advance into the enemy's trenches, Corporal Sanders found himself isolated with a party of 30 men. He organized his defences, detailed a bombing party, and impressed on his men that their duty was to hold the position at all costs.

Next morning he drove off an attack by the enemy, and rescued some prisoners who had fallen into their hands. Later, two strong bombing attacks were driven off.

The following day he was relieved, after showing the greatest courage, determination, and good leadership during 36 hours under very trying conditions. All the time his party were without food and water, having given all their water to the wounded during the first night. After the relieving force was firmly established, Corporal Sanders brought his party, 19 strong, back to the British trenches.

He was invested by the King at Buckingham Palace on Nov. 15, 1916. On June 27, 1917, Corporal Sanders was given a commission, and was gazetted to the 2nd Prince of Wales's Own (West Yorkshire Regiment). He was promoted acting Captain later the same year.

For service at Kemmel Hill, on April 25, 1918, Captain Sanders was awarded the Military Cross.

MARKING IMPORTED REFRACTORY BRICKS.

The inquiry by the Board of Trade into an application under the Merchandise Marks Act, 1926, for a Marking Order in respect of imported refractory bricks was continued on Monday and Tuesday, Oct. 21 and 22. On Monday, Oct. 28, the final speech on behalf of the applicants was made.

Since the evidence with regard to refractory bricks mentioned in our report of the earlier proceedings—see p. 257—there has been no reference to these; and during the closing stages of the inquiry on Oct. 22, Counsel for the opposing importers told the Committee he was not concerned with refractory bricks now. Presumably, therefore, there is now no opposition to that part of the application. It was asked that, if any Order were made, it should not extend beyond refractory bricks and ordinary pressed bricks for building purposes, and that any such Order should not come into operation until July 1, 1930; it being stated that the foreign brickyards have now ceased to manufacture for this year, and that their present stocks, which could not be marked, would not be disposed of until the end of June, 1930.

ALDERSHOT COMPANY'S NEW SHOWROOMS.

Opening Ceremony.

The imposing new western area showrooms of the Aldershot Gas, Water, and District Lighting Company (described and illustrated in the current issue of the "Gas Salesman," which have been built on a commanding corner site in the Fleet Road, were opened on Oct. 17 by Mrs. R. W. Edwards, Mayoress-elect of Aldershot, wife of the Managing Director of the Company.

The doors of the main showrooms Mrs. Edwards unlocked with a silver key presented to her by the Architect, Mr. John Love, of Fleet; and she carried a bouquet of bronze chrysanthemums handed her by Mrs. Love.

The building is of red brick with white stone, with luxurious internal fittings. The latter were by the Nautilus Company, of Luton.

As befits the nature of the commodity supplied, the Gas Company's new showrooms are at night a blaze of light, and when the shop is closed, the whole can be effectively illuminated with ruby floodlighting.

NEW COKE-GRADING PLANT AT CARDIFF.

South Wales Company Meets Increasing Demand.

Cardiff coal merchants visited the Grangetown works of the Cardiff Gas Light and Coke Company on Wednesday, Oct. 23, to inspect the new machinery installed to meet the increasing demand for graded gas coke.

Members of the staff explained in detail to the visitors the nature of the new plant—one of the most up-to-date of its kind in the country—which is designed to provide the public with a suitable smokeless domestic fuel. Three grades of coke are produced—"broken" coke for open grates, kitchen ranges, central heating, and the new type of bakers' ovens; "nut" coke for closed and slow combustion stoves and hot-water supply boilers; and "bean" coke for smithy and kindred work.

A cart loading platform has been erected with separate delivery and also a railway siding underneath to facilitate loading large quantities.

The Grangetown Gas-Works claims to be the only works in South Wales supplying suitably graded smokeless gas coke for domestic and industrial needs, and this new venture of the Company is to meet the growing demand.

The party were afterwards shown the various manufacturing processes at the Grangetown works, and they were obviously impressed by the care taken in blending selections of the best South Wales and Yorkshire coals to produce the most suitable type of coke. Subsequently they were entertained to tea.

NATIONAL BENZOLE COMPANY.

Assisting the Distressed Industries.

Since the reduction in the price of "National Benzole" mixture to that of the other leading motor oils a short while back, the motoring public has been taking a much wider interest in this high quality fuel.

The National Benzole Company, Ltd., who are the sole distributors of "National Benzole" mixture, and the sales organization of British benzole producers to market and distribute their own product direct, had an interesting stand at the recent Motor Show at Olympia, and the high quality of the fuel was clearly explained and demonstrated. The real difference that is claimed by the mixture over ordinary petrol is the high content of British benzole which makes this difference, for benzole is recognized the world over as the most potent fuel procurable for internal combustion engines. "National Benzole" mixture, though it is reduced by 1d. per gallon and is now the same price as high-grade petrol, continues to give the same high power and remarkable hill-climbing performance. It still reduces the frequent necessity for de-carbonizing, and eliminates "pinking." Its rapid acceleration properties are still there. It is clean, gum free, and British. Above all, the mixture is still claimed to give at least 15 p.ct. increased mileage, and this shows a considerable saving in running costs over a very short period. The quality, in fact, remains the same as it did when it was 1d. a gallon more.

Chiefly owing to the great popularity and demand for "National Benzole" mixture and the limited production, which, under present conditions, it is impossible to increase greatly, the Company have hitherto been unable constantly to satisfy the need of the motoring public for this product. Recognizing the value of the aromatic hydrocarbons, the common practice of the motorist has been to fill his tank partly with "National Benzole," to which the varying grades of petrol available have been added. The filling of a tank with certain proportions of benzole and petrol does not produce a scientific mixture. It is a mistake to imagine that if petrol is poured into a tank containing benzole the two products automatically mix, as the petrol, being much lighter, will float on the top, resulting, obviously, in the car being driven on benzole for a time and later on petrol, which would give unsatisfactory running without effecting economy.

MORE THERMAL ENERGY.

Taking the products separately, benzole is a heavy spirit containing more thermal energy per gallon than any known spirit suitable for use in internal combustion engines, whereas the super-grade petrol is a very highly refined light spirit. The ideal spirit, therefore, is a combination of the two fuels blended or mixed in a scientific manner to guarantee the correct proportions in every drop that passes through the carburettor.

After exhaustive experiments and tests, the National Benzole Company have proved that the spirit most generally suited to the present type of vehicle is a mixture of "National Benzole" and super-grade petrol. All their supplies of "National Benzole" will ultimately be absorbed in the preparation of this mixture, and by this procedure they are in a position to meet the general demand for a high-grade fuel. Their policy is to offer the public this high-grade spirit of a high standard specification at an economical price.

"National Benzole" mixture, a combination of Nature's products and the highest degree of scientific research, is undoubtedly the most economical motor fuel. The mixture has a very low boiling-point, due to the high benzole content, so that the fuel easily ignites, and, in a cold engine, very speedily reaches full efficiency.

The National Benzole Company has no shareholders other than the actual producers, and these are the coal, iron, and steel organizations of this country; therefore, the *whole* net revenue automatically reverts to these distressed basic industries. At the present time only 2½ gallons of benzole are obtained from one ton of coal carbonized, but research is revealing the possibilities of greater yields, which soon may become commercially interesting.

Britain has imported hundreds of millions of gallons of motor spirit from America during the last twelve months alone, and no small amount from Russia. Yet here in Great Britain, our coal industry is experiencing a period of depression unknown before. It is from the coal industry of this country that "National Benzole" mixture is obtained. The potentiality of coal is still in its infancy, and the motorist, by purchasing this product of British collieries, is, besides making a saving for himself by using a more efficient fuel; encouraging research into greater possibilities; assisting the exploitation of home coal resources; and helping to maintain our insular independence where motor spirit is concerned.

TRADE NOTES.

B.T.-H. Productions.

From the British Thomson-Houston Co., Ltd., of Rugby, we have received their latest specifications of squirrel-cage induction motors, of the three-phase, protective type; iron clad oil-immersed thermal circuit breakers—direct, or direct and remote, push-button control; and D.C. starting rheostats, which are suitable for starting against full-load torque. The starters are of the totally enclosed type.

Extension of Purifier Plant.

The Newcastle-upon-Tyne and Gateshead Gas Company have placed an order with Messrs. Ashmore, Benson, Pease, & Co., Ltd., of Stockton-on-Tees, for the extension of purifying plant. The contract comprises three overhead purifying boxes 55 ft. by 45 ft. by 8 ft. deep, together with valves, pipe connections, platform plates, runways, and accessories, all to be supplied and erected upon a reinforced concrete superstructure at their Redheugh Works.

GAS ACTS (1920 AND 1929) ORDERS.

SECTION 6.

Barrow-in-Furness Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Blackburn Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Lincoln Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Middlesbrough Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Saffron Walden Corporation.

The Corporation shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Winsford Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

Wombwell Urban District Council.

The Council shall, from April 1, 1930, charge according to the number of B.Th.U. supplied, and shall on or before Jan. 1 give notice of the calorific value of the gas they intend to supply.

SPECIAL ORDER.

Halstead Gas Company, Ltd.

To increase the standard price of gas from 5s. to 6s. 4d. per 1000 c.ft.

DECLARATIONS OF CALORIFIC VALUE.

Hereford Corporation.—450 B.Th.U. (April 1, 1930).

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Oct.* 28.

Prices of tar products are unchanged, pitch being about 47s. 6d. f.o.b. and creosote, for export, 6¾d. per gallon f.o.b.

Pure toluole is 2s. 3d. to 2s. 4d. per gallon; 95/160 solvent naphtha, about 1s. 5d.; pure benzole, about 1s. 11d.; and pyridine bases, 3s. 9d. to 4s. per gallon.

Tar Products in the Provinces.

Oct. 28.

The average prices of gas-works products during the week were: Gas-works tar, 25s. to 30s. Pitch—East Coast, 47s. 6d. f.o.b. West Coast—(f.a.s.) Manchester, 42s. to 42s. 6d.; Liverpool, 45s. 6d. to 46s. 6d.; Clyde, 45s. 6d. to 46s. 6d. Toluole, naked, North, 1s. 7¼d. to 1s. 8¼d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid and salty, 3¼d. to 3½d.; low gravity, 2d. to 2¼d.; Scotland, 3¼d. to 3½d. Heavy oils, in bulk, North, 5½d. to 6d. Carbolic acid, 60's, 2s. 5½d. to 2s. 6½d. prompt. Naphthalene, £12 to £14. Salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.	s. d.	
Crude benzole . . .	0 10	to 0 11	per gallon at works
Motor ,, . . .	1 5	,, 1 6	,, ,, ,,
90 p.ct. ,, . . .	1 7	,, 1 8	,, ,, ,,
Pure ,, . . .	1 10	,, 1 11	,, ,, ,,

CONTRACTS OPEN.

Coke Screen.

The Gas Committee of the Newbury Corporation have under consideration the erection of a rotary coke screen. [See advert. on p. 338.]

Gasholder, Tank, and Foundations.

The Gas Committee of the City of Plymouth invite tenders for the supply, delivery, and erection of a spiral-guided gasholder, with steel tank and foundations, &c. [See advert. on p. 338.]

Retorts, Firebricks, &c.

The City of Salford invite tenders for the supply of retorts, firebricks, &c. [See advert. on p. 338.]

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

Except in the large steams section, both Northumberland and Durham, there is little movement in the market. Towards the end of the week, a slightly better tone was perhaps discernible in some classes of Durham unscreened coals, but no general improvement is likely until the political aspect is clearer, and trading over next year is likely to depend to a large extent upon early developments in this direction.

Best Northumberland screened steams are now quoted strongly at 16s. 9d. to 17s. f.o.b., and are fully booked for a considerable time ahead. Gas coals have shown a steadier tendency in the last few days. Wear Specials still ask 17s. 3d. to 17s. 6d., and best qualities 16s. 6d. to 16s. 9d., but seconds are better at 15s. to 15s. 3d. Coking brands are, if anything, slightly harder, some better sorts now quoting 15s. 9d. f.o.b.; but the insistent demand of a few months ago is sadly lacking. Bunkers are quiet, best sorts asking 15s. 6d., and seconds being easy at round 14s. 6d.

Gas coke is enjoying active demand, and 25s. f.o.b. is steadily asked for shipment.

YORKSHIRE AND LANCASHIRE.

A quieter tone prevails for large steams on export account; but there is little alteration in the values. In secondary qualities, the position is hardly so strong, with recent quotations maintained. The industrial fuel trade shows no alteration. Prices are: Washed trebles 18s. to 18s. 6d., doubles 17s. to 18s., and singles 16s. 6d. per ton f.o.b. The demand for bunker fuel continues quiet, and in some grades quotations are weaker. Although the request for furnace coke is hardly so strong, recent prices are maintained. There is a slightly stronger inquiry for gas coal, which is easily met.

The following are the Humber bunker and export prices f.o.b. usual shipping ports:

South Yorkshire.—Hards, Association, bunkers 19s., export 18s. 6d.; screened gas coal, export 18s. to 18s. 6d.; washed trebles, export 18s. to 18s. 6d.; washed doubles, bunkers 18s. 6d., export 17s. to 18s.; washed singles, export 16s. 6d.; washed smalls, bunkers 15s. 6d. to 16s., export 15s.; rough slack, bunkers 13s. 6d. to 13s. 9d., export 12s. 6d. to 13s.; smithy peas, export 18s. 6d. to 19s. 6d.

West Yorkshire—Hartleys, f.o.b. Goole, bunkers, 17s. 6d., export 17s. to 18s.; screened gas coal, export 18s. to 18s. 6d.; washed trebles, export 18s.; washed doubles, export 16s. 3d. to 16s. 9d.; washed singles, export 16s.; washed smalls, bunkers 15s. 3d., export 14s. 6d.; unwashed trebles, export 17s. to 17s. 9d.; unwashed doubles, export, 15s. to 16s.; rough slack, bunkers 13s. 6d., export 11s. to 12s. 6d.; coking slack, export 12s.

Derbyshire and Nottinghamshire.—Top hards, bunkers 19s., export 18s. to 18s. 6d.; cobbles, export 17s. 6d. to 18s. 6d.; washed trebles, export 18s.; washed doubles, bunkers 18s. 3d., export 17s. to 17s. 3d.; washed singles, export 16s. to 16s. 6d.; washed smalls, bunkers, 15s. 3d. to 15s. 6d., export 14s. 6d.; unwashed doubles, export 16s.; rough slack, bunkers 13s. to 14s., export 12s. 6d.

Yorkshire, Derbyshire, and Nottinghamshire.—Screened steam coal, bunkers 17s. to 18s., export 16s. 6d. to 17s.; gas coke, export 22s. 6d. to 25s.; furnace coke, export 23s. to 24s.; washed steam, Goole (West Yorks.), bunkers 17s.; Hull (West Yorks.), bunkers 17s. 9d.; Hull (South Yorks.), bunkers 18s., export 17s. per ton.

MIDLANDS.

Gas engineers who did not cover their requirements for the season at midsummer are being asked to pay 9d. to 1s. above the contract rates then laid down. Collieries say they are bound to protect themselves in forward commitments against the threatened increase in production costs. Bargaining is not at all brisk.

In other departments of the market business reflects but faintly the progress of the season. More coal is going into consumption; but the movement is not very perceptible at the pits. Except as regards the lower grades of household fuel, stocks put down at summer prices still suffice for a large proportion of the domestic requirements. Hence the market remains sluggish. While some of the collieries hold rigidly to the advanced rates notified at the beginning of October, concessions are being made in other cases.

There is no indication, apart from one or two cases which have no general significance, of expansion in the industrial coal trade. Supplies are ample.

The rise in coke has been arrested. Very little blast-furnace coke is obtainable on the open market, however. Prices are firm round 18s. at the ovens.

OVERSEAS OPPORTUNITIES.

[From the Board of Trade Journal.]

British India.

Creosote.—The Director-General, India Store Department, Belvedere Road, London, S.E. 1, invites tenders for:

1500 tons creosote.

Tenders due Nov. 12, 1929.

Forms of tender available from the above at a fee of 5s., which will not be returned.

Tenders are being called for simultaneously in India.

Reduction in the Price at Boston.

The Directors of the Boston Gas Light and Coke Company announce that as and from the ensuing November meter readings, and the next following prepayment meter collections, the price of gas supplied through ordinary meters will be reduced to 10·4d. per therm (subject to a discount as mentioned hereunder), being equivalent to a reduction of 4½d. per 1000 c.ft.; and for gas supplied through prepayment meters the price will be 12d. per therm net, both in accordance with the provisions of the Company's new Special Order. The following scale of discounts on payment of accounts for gas consumed by ordinary meters by the end of the respective months in which such accounts are rendered will be allowed as follows: For gas engine purposes, 20 p.ct.; for industrial gas heating purposes as schedule, 20 p.ct.; for all other purposes, 5 p.ct. In addition to these discounts, the existing special rates of discount to large consumers according to the total quantity of gas consumed for all purposes per annum will be continued—viz., to consumers of 500 therms per annum and up to 2000, 5 p.ct.; to consumers of 2000 therms per annum and up to 5000, 7½ p.ct.; and to consumers of 5000 therms per annum and upwards, 10 p.ct.

Convected Heat Company has been registered with a nominal capital of £500 to carry on the business of heating, gas, electric light, water, and sanitary engineers.

Dover Coal, Gas, and Power Company, Ltd., has been registered as a Private Company, with a nominal capital of £100 in £1 shares, to carry on business as indicated by the title.

Results at Colwyn Bay.—The Colwyn Bay gas undertaking shows a net profit for the year of £2772, out of which renewals and expenditure of a capital nature amounting to £2207 have been met, leaving a net surplus of £567.

Meters, Ltd., Dividend Declaration.—The Directors of Meters, Ltd., at their meeting, on Oct. 22, declared the following on account of the dividends for the current year: On the preference shares at the rate of 5½ p.ct. per annum; and on the ordinary shares at the rate of 5 p.ct. per annum.

Imperial Continental Gas Association.—The Board of Directors have declared, out of the ascertained profits for the half-year ended June 30, 1929, an interim dividend at the rate of 5 p.ct. actual, on the £1,976,000 original capital stock of the Association, payable, *less* income-tax, at 4s. in the £, on Nov. 27, 1929. The transfer books of the Association will be closed from Nov. 11 to Nov. 23, both days inclusive.

Electricity Failure at Hampstead.—The electric light failed at Hampstead on the night of Oct. 22, owing to a small explosion in a manhole in West-End Lane. The explosion forced up a small portion of the pavement and sent up a stream of smoke, putting telephone lines out of action. Comparatively few houses in the district, apparently, are served with gas, and very considerable inconvenience was caused by the failure.

Tunbridge Wells Stock Issue.—As will be seen from our advertisement columns, Messrs. A. & W. Richards, of 37, Walbrook, E.C., are offering for sale by tender, on behalf of the Directors of the Tunbridge Wells Gas Company, an issue of £25,000 sliding scale stock at a minimum price of issue of £106 per £100, yielding at that price £6 15s. 10d. p.ct.; and also £15,000 5½ p.ct. perpetual debenture stock, at a minimum price of issue of par. Tenders should be received not later than 11 o'clock a.m. on Tuesday, Nov. 12.

Another East London Electricity Failure.—The third electricity failure in three days is reported from the East Leyton district on the night of Oct. 26. The districts of East Leyton, Leytonstone, Wanstead, Barkingside, Chigwell, Hainault, and Woodford were all affected, while the week-end shopping rush was in full swing. An official of the County of London Electric Supply Company stated that all the Company's eastern areas were affected. The failure was caused, it is understood, by a main feeder going out at the Barking power station.

South Metropolitan Gas Company's Exhibit at Camberwell.—A most successful exhibition of industries, organized by the Camberwell, Peckham, and Dulwich Chamber of Commerce, was held at the Public Baths, Camberwell, S.E., for five days, from Oct. 14 to 18. In all, there were 68 stands, out of which the South Metropolitan Gas Company had eight. The Company's exhibit demonstrated the efficiency of "Metro" gas and coke-heated appliances for room heating, cooking, and water heating. They also exhibited the new "Metro" coke grate, which is the latest addition to the list of standardized "Metro" appliances, which was fully explained to all visitors. The Company also gave expert advice on the efficient use of gas and coke for domestic purposes. One stand was also taken by the Ruud Manufacturing Company, Ltd., on which they showed their self-acting gas water heaters.

The Ministry of Health has approved the application of the Sedgley Urban Council to borrow £4300 for the provision of a new gas plant, mains, and equipment.

At a meeting of the Blackburn Town Council, on Oct. 3, Councillor H. Johnson (Labour) criticized the policy of the Gas Committee in voting £10,000 to the relief of the rates last year, and at the close of the year having a deficit of £5000 as the result of this policy.

Called to a house in Warren Avenue North, Fleetwood, where a fault had developed in the gas meter, a fitter named George Wragge was overcome by the fumes and was found lying unconscious. While Wragge was being revived a second fitter was summoned, and he also succumbed, the woman of the house and a neighbour applying artificial respiration with success. A third man sent by the Gas Department was able to stop the leaking gas.

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME	Quotations. Oct. 25.	Rise or Fall on Week.	Transactions Lowest and Highest Prices.
£			%p.a.	% p.a.				
171,978	Stk.	Aug. 15	5	5	Aldershot 5 p.c. max. C.	70—75	..	..
412,992	,,	,,	4	4	Do. 4 p.c. Pref.	73—76	..	..
1,551,898	,,	Sept. 26	7½	7½	Alliance & Dublin Ord.	96—99	+1	97½
874,000	,,	July 11	4	4	Do. 4 p.c. Deb.	62—65	..	..
522,655	,,	Aug. 29	7	7	Barnet Ord. 7 p.c.	112—115	..	114
900,000	1	Oct. 24	1/4½	1/4½	Bombay, Ltd.	⅜—⅝*	..	18/-
172,500	10	Aug. 29	8½	9	Bournemouth 5 p.c.	12½—13½	..	..
500,050	10	,,	7	7	Do. B 7 p.c.	12⅜—12¾	+⅛	..
439,160	10	,,	6	6	Do. Pref. 6 p.c.	10½—11	..	..
50,000	Stk.	July 11	3	3	Do. 3 p.c. Deb.	54—57	..	..
152,025	,,	,,	4	4	Do. 4 p.c. Deb.	72—75	..	..
857,900	,,	Aug. 29	7½	7½	Brighton & Hove 6 p.c. Con.	113—116	..	..
271,880	,,	,,	6½	6½	Do. 5 p.c. Con.	100—103	..	..
1,287,500	,,	July 25	5	5	Bristol 5 p.c. max.	88—89a	..	..
985,000	,,	Sept. 12	7½	7	British Ord.	115—118	..	115—116
100,000	,,	June 27	7	7	Do. 7 p.c. Pref.	112—117	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	71—74	..	..
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb.	94—97	..	..
190,000	10	May 30	6	8	Cape Town, Ltd	9—10	..	9½
100,000	10	Apl 24	4½	4½	Do. 4½ p.c. Pref.	6½—7½	..	..
150,000	Stk.	June 27	4½	4½	Do. 4½ p.c. Deb.	71—76	..	..
496,860	,,	July 25	6	6	Cardiff Con. Ord.	98—101	..	100
197,860	,,	June 27	7½	7½	Do. 7½ p.c. Red. Deb.	99—102	..	..
187,150	,,	Aug. 15	6½	5	Chester 5 p.c. Ord.	87—92b	..	..
98,936	1	Oct. 10	1/2-	1/2-	Colombo Ltd. Ord.	84/-—96/-*	..	..
24,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	19/-—21/-*	..	..
375,402	1	Oct. 10	1/9½	1/9½	Colonial Gas Assn. Ld. Ord.	23/6—25/6*	..	..
187,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	20/-—22/-*	..	..
3,073,280	Stk.	July 25	7	5	Commercial Ord.	93—96	..	93
475,000	,,	June 13	3	3	Do 3 p.c. Deb.	56—59	..	..
787,550	,,	Aug. 15	7	7	Croydon sliding scale	105—108	..	103—106
409,100	,,	,,	5	5	Do. max. Div.	77—82	-3	..
542,270	,,	Aug. 29	10	7	Derby Con.	118—121e	..	..
55,000	,,	June 27	4	4	Do. Deb.	68—71e	..	..
309,000	,,	Aug. 29	5	5	East Hull Ord. 5 p.c.	78—76	..	..
1,002,180	10	Sept. 12	†7	†4	European, Ltd.	13—15	-½	12½—£18/16/6
18,708,480	Stk.	July 25	£3	£3	Gas Light & Coke 4 p.c. Ord.	18/6—19/-f	+-/4½	18/1½—18/9
3,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	61—63	..	..
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	70—73	..	70½—73
3,808,630	,,	June 13	3	3	Do. 3 p.c. Con. Deb.	55—58	..	57½—58
2,042,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	97—100	..	100
68,500	,,	Aug. 29	7	7	Hastings & St L. 5 p.c. Conv	98—103	..	..
268,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	77—82	..	..
10,000	10	Oct. 10	†10	†10	Hongkong & China, Ltd.	13½—14½*	..	..
313,800	Stk.	Aug. 29	6	6½	Hornsey Con. 3½ p.c.	84—87	..	..
1,876,000	,,	May 30	10	20	Imperial Continental Gas.	365—385	-15	385—386
338,180	,,	Aug. 15	8½	9½	Do. 8½ p.c. Red. Deb.	70—75	..	72
385,349	,,	Aug. 15	7½	8	Lea Bridge 8 p.c. Ord.	115—118	..	..
2,145,807	,,	Aug. 15	6½	6	Liverpool 5 p.c. Ord.	94—95b	..	..
600,000	,,	Sept. 26	7	7	Do. 7 p.c. Red. Pref.	99—101b	..	..
186,756	,,	Aug. 29	8	9	Maidstone 5 p.c. Cap.	122—127	..	124½
69,480	,,	June 27	3	3	Do. 3 p.c. Deb.	53—56	..	..
15,000	b	June 13	†8	†10	Malta & Mediterranean	6½—8	..	..
892,000	—	Oct. 1	5½	5½	Metrop'l'n (of Melbourne) 5½ p.c. Red. Deb.	98—99	..	..
641,930	Stk	May 30	†5	†9	Montevideo, Ltd.	105—108	..	106½—107½
9,061,318	,,	July 25	5	5	Newcastle & Gateshead Con.	16/9—17/3d/f	..	..
682,856	,,	,,	4	4	Do. 4 p.c. Pref.	71½—72½d	..	..
691,705	,,	June 27	8½	8½	Do. 8½ p.c. Deb.	67½—68½d	..	..
181,750	,,	Aug. 29	7/1/0	7½	North Middlesex 6 p.c. Con.	110—115	..	..
900,000	,,	Apl. 24	9	7	Oriental, Ltd.	111—116	..	..
205,162	,,	June 27	8	8	Plym'th & Ston'house 8 p.c.	110—115	..	111
424,416	,,	Aug. 29	8½	8	Portsm'th Con. Stk. 4 p.c. Std.	113—118	..	..
341,446	,,	,,	5	5	Do. 5 p.c. max.	80—83	..	8'—82
2,334,464	1	June 27	—	‡5	Primitiva Ord.	32/6—34/6	-/6	33/1½—33/6
344,500	100	June 8	4	4	Do. 4 p.c. Red. Deb.	92—95	..	..
695,000	Stk.	July 25	4	4	Do. 4 p.c. Red. Deb. 1911	79—82	..	..
416,345	,,	June 27	4	4	Do. 4 p.c. Cons. Deb.	79—82	..	..
150,000	10	Sept. 26	6	6	San Paulo 6 p.c. Pref.	8½—9	..	8¾—9
1,736,968	Stk	Aug. 29	6½	6½	Sheffield Cons.	105—107e	..	..
95,000	,,	Jan. 10	4	4	Do. 4 p.c. Deb.	75—77e	..	..
90,000	10	June 13	‡4	‡4	South African	4—6	..	..
6,809,895	Stk.	July 26	7½	5	South Met. Ord.	99—101	..	99½—100½
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	106—109	..	106½
1,895,445	,,	July 11	3	3	Do. 3 p.c. Deb.	54—57	..	55
784,000	,,	Sept. 12	8½	8½	Do. 6½ p.c. Red. Db.	98—100	..	..
91,500	,,	Aug. 15	8½	8½	South Shields Con.	109—111d	..	..
1,548,795	,,	July 25	6½	6½	South Suburban Ord. 6 p.c.	101—104	-1	102½
468,887	,,	June 27	5	5	Do. 5 p.c. Deb.	94—97	+1	94
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191,276	,,	June 27	4	4	Do. 4 p.c. Deb.	70—73	..	..
179,014	,,	July 25	8	8	Sutton Ord.	116—119	..	..
67,828	,,	June 27	5	5	Do. 5 p.c. Deb.	90—93	..	..
350,000	,,	Feb. 21	7	7	Swansea 7 p.c. Red. Pref.	100—102	..	..
300,000	,,	June 27	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	..
1,002,275	,,	Aug. 15	6½	6½	Tottenham District Ord.	104—107	-1	..
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	97—100	..	..
191,265	,,	June 13	4	4	Do. 4 p.c. Deb.	74—77	..	..
389,094	,,	Aug. 29	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	93—98	..	..
98,880	,,	,,	5	5	Do. 5 p.c. pref.	85—90	..	..
80,000	,,	July 11	9	9	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	135—140	..	..
355,686	,,	,,	7½	7½	Do. B 5½ p.c.	112—117	..	..
482,585	,,	,,	6.75	6.75	Do. C and New	95—100	..	..
852,000	,,	,,	7½	7½	Do. Wimbledon 5 p.c.	105—110	..	..
98,000	,,	,,	7½	7½	Do. Epsom 5 p.c.	113—118	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref.	87—92	..	..
88,410	,,	June 27	3	3	Do. 3 p.c. Deb.	54—57	..	..
284,743	,,	,,	4	4	Do. 4 p.c. Deb.	74—77	..	..
207,500	,,	,,	5	5	Do. 5 p.c. Deb.	93—96	..	..

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"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.
(See "Gas Salesman," p. 272.)
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FRESH OXIDE { ON SALE / OR LOAN.

BRITISH MAKE,
IMMEDIATE DELIVERY,
NO EXCESS MOISTURE.
IMMEDIATE ACTIVITY.
MINIMUM BACK PRESSURE.
MINIMUM EXPOSURES.
MINIMUM LABOUR.

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ON SULPHUR CONTENT.
ON **BLUE** CONTENT.

SPECIALISTS IN PURIFICATION.

GAS PURIFIED IN 1928
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ROBERT DEMPSTER & SONS, Ltd., ELLAND, Builders of CARBONIZING PLANTS, both Horizontal and Vertical. Manufacturers of CONDENSERS, PURIFIERS, GAS-HOLDERS, &c., also every description of COAL and COKE HANDLING PLANT. Telegrams: "DEMPSTER, ELLAND." Telephone: ELLAND 261 (Private Branch Exchange).

EXTENSIONS and Renewals. Ask us to quote before ordering GAS APPARATUS, COKE-OVEN PLANT, STRUCTURAL STEELWORK. Competitive prices. First-Class Workmanship. Satisfaction Guaranteed.
FIRTH BLAKELEY, SONS, & CO., LTD., CHURCH-FENTON, YORKSHIRE.

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MANUFACTURERS and CONTRACTORS for
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WATER-GAS PLANT

ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, LIMITED.
22, Carlisle Place, London, S.W.

HUTCHINSON BROTHERS, Ltd.
FALCON WORKS, BARNSLEY.
MANUFACTURERS OF
GAS METERS (Ordinary and Slot).
"FALCON" INVERTED LAMPS, SQUARE STREET LANTERNS SUPERHEATER BURNERS, and CONVERSION SETS for Street Lanterns

OFFICES.

OFFICES—Handsome modern suites in Victoria Station House from 600 to 5500 sq. ft. Partitioned and Decorated. Rent, including Rates, Taxes, Central Heating, all Modern Conveniences, 10s. per foot per Annum.
Apply to the MANAGER, VICTORIA STATION HOUSE, VICTORIA STREET, S.W. 1.

APPOINTMENTS, &c., WANTED.

ARTICLED Pupil, 23 years of Age, REQUIRES APPOINTMENT. Good Knowledge of Carbonization (in Horizontal and Vertical Retorts), Chemistry, Distribution, and Engineering. Holder of First-Class Ordinary Certificate in Gas Engineering. Address, No. 8005, "GAS JOURNAL," 11, BOLT COURT, FLEET ST., E.C. 4.

APPOINTMENTS, &c., VACANT.

COMPETENT Accountant wanted by the Lowestoft Water and Gas Company to keep the Company's Accounts, prepare Balance Sheets, &c. Experience of similar work with Water or Gas Companies essential. Age not to exceed 40.
Salary, £300 per Annum.
Applications, together with *copies* of three recent Testimonials, to be made to T. V. JOHNS, Manager, WATER AND GAS OFFICES, 137, LONDON ROAD NORTH, LOWESTOFT.

FLEETWOOD GAS COMPANY.

APPLICATIONS are invited for the position of SECRETARY. Previous experience of Gas Works Secretarial and Accountancy duties necessary.
Applications, giving full Particulars and Salary required, addressed to the CHAIRMAN, GAS OFFICES, LORD STREET, FLEETWOOD, not later than Saturday, Nov. 2, 1929.

WANTED—By a progressive Under- taking, 30 miles from London, a DISTRICT INSPECTOR.
Applicant must be of good address, able to Control Fitters, Interview Consumers, and Prepare Details for Estimates. Wages, £4 per Week.
Apply, stating Age, Qualifications, and Experience, with *copies* of Testimonials (which will not be returned), to No. 8002, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

WANTED — Experienced Salesman for New Showroom of the Stirling Gas Light Company. Must be of good address, and possess a thorough knowledge of all types of Modern Gas Appliances.
Apply, in writing, with References, stating Wages required, to JOHN M. SMITH, Engineer and Manager, GAS-WORKS, STIRLING.

REQUIRED a Man with Experience in the DESIGN and USE of APPARATUS for WATER HEATING and STEAM RAISING by GASEOUS FUEL.
Applicants are requested to send, in triplicate, full details of their Training and Experience, and to state their Age and Salary required, to No. 8003, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

GENERAL Works Foreman required for Gas Works in England making 614 Million c.ft. per Annum. Applicant must be a good Manager of Men, one with previous Experience in Gas Works, been trained as a Mechanical Engineer, and passed through the workshops of an Engineering Firm, and be capable of Taking Charge of Men and directing them in the Erection, Repair, and Maintenance of Plant, and Work generally.
State Age, Experience, and Salary required, to No. 8004, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, E.C. 4.

COUNTY BOROUGH OF STOCKPORT.

WANTED, immediately, First-Class GAS-FITTER. Thoroughly experienced in the Fixing and Maintenance of all Modern Appliances.
Apply, stating Age, Experience, and Qualifications, together with *copies* of recent Testimonials, to W. S. SOWERBUTTS, Engineer and Manager, GAS-WORKS, STOCKPORT, not later than noon on Saturday, Nov. 9, 1929.
The successful candidate will be required to produce a satisfactory Medical Certificate, and contribute to the Superannuation Fund, established under the provisions of the Local Government and other Officers' Superannuation Act, 1922.
Oct. 28, 1929.

PLANT &c., FOR SALE & WANTED.

PLANT FOR SALE.

GASHOLDER.—Spiral Guided 100,000 c.ft. capacity, and Steel Tank, with cup. New Outer Lift could be supplied to make capacity 200,000 c.ft. Attractive price for prompt acceptance.
Purifiers—Dry Lute Type. Two Sets of Four, 10 ft. square; One Set of Two, 10 ft. square; and One Set of Two, 8 ft. square, with Lifting Gear Valves, &c.
Meters.—Two Rectangular Station Meters fitted with New Drums, 15,000 c.ft. per hour capacity. Cylindrical Station Meters, 10,000, 4000, 3600, and 2000 c.ft. capacities and smaller.
Station Governors.—Parkinson, Cowan, Braddocks, and Peebles, 4 in., 6 in., 8 in., 9 in.
Retort Ironworks for beds of 4's, 5's, 6's, 7's, and 8's. 22 in. by 16 in. Self-Sealing Mouthpieces. 6 in. Ascension Pipes and all to follow.
Washers and Tar Extractors.—Livesey and Cripps type. 2 million, 500,000, 400,000, 250,000, 200,000, 150,000 and 100,000 c.ft. per day.
Exhausting Sets.—Steam and Gas Engine-driven, 5000 to 40,000 c.ft. per hour capacity.
Storage Tanks.—Large number in Stock (Rectangular and Cylindrical). Tar Stills, &c.

Tar and Liquor Pumps, Steam and Belt-Driven.
Air Receivers, Fans, Blowers, Valves, Rivetted Tubes.

Firth Blakeley, Sons, & Co., Ltd.
(Second-Hand Plant Dept.),
Vulcan Ironworks, Church-Fenton, Leeds.
Telephone: 11, South Milford. Telegrams: Blakeleys, Church-Fenton.

GAS-WORKS Plant. We Purchase, for Dismantling, for Re-Use or Scrap, any DISCARDED PLANT or IRONWORK. Best prices, prompt removal by experienced staff, covered by insurance for all risks.
FIRTH BLAKELEY, SONS, & CO., LTD., Second Hand Plant Department, CHURCH-FENTON, *via* LEEDS.

ROAD Tank-Wagons for Transport of Gas Oil and all Gas-Works Residuals. Tanks sent to work in any district. Contractors to London Gas Companies and Tar Distillers.
CROW CARRYING CO., LTD., HART'S LANE, BARKING, ESSEX.

GAS Plant for Sale. — Combined STOKING MACHINE with DE BROUWER CHARGER, New 1924.
National GAS ENGINE, and 14 KW. GENERATOR by Lancashire Dynamo Company, Ltd.
TULLY PLANT, capacity 100,000 c.ft. per day, with Boiler, Gas Engine, and Fan.
Further particulars can be obtained from J. E. HOLLIDAY, Engineer, Manager, and Secretary, OTLEY GAS COMPANY, OTLEY, YORKS.

BEAUMONTS, of Bow, will Purchase:
DISUSED GAS-WORKS PLANT of every description, large or small.
OBSOLETE MACHINERY for Breaking, taking delivery *in situ*.
SCRAP METALS. All kinds. And guarantee a clearance.
RETORTS. We will take over your Old Retort Beds, Dismantle, and Clear.
BUILDINGS. We demolish any Building or Structure in Brick, Iron, Timber, or Stone. Including High Chimneys.
We accept ALL RISKS, and invite Offers from Gas-Works for Services not suited to regular Staffs.
W. G. BEAUMONT & SON, PRIORY WORKS, BOW, LONDON, E. 3.
(Percy E. Beaumont). The Original Firm.
'Phones, East 0379/4410. Wires, Norustbeau, London.

BEAUMONTS, of Bow, have for Sale:
BLOWERS. Jenkins 9 in. Discharge. Direct Coupled to Mather & Platt Motors, 7 H.P., 240 Volts D.C., Common Bed Plates.
HEATERS OR CONDENSERS. All Steel; 133½ ft. by 4½ ft. dia. Containing 200 2-in. Tubes.
STORAGE TANK, 14 ft. by 4½ ft. dia. Dished Ends, ⅜ plate.
TANK, 36 ft. dia. by 12 ft. deep, ⅝ shell.
PUMPS, Steam Driven for Feed. 1 and 2 in. delivery.
PUMP, Steam Driven for Well. 3 in. delivery.
CRANE SKIP, ½ yard tipping.
BOTTLE JACKS, 10 Ton, with G.M. Nuts.
SULPHATE PLANT, Half-ton, by Biggs Wall.
Also, for IMMEDIATE DELIVERY:
HOLDER, 160,000 c.ft.; EXHAUSTERS, several; STATION METERS; BOILERS, STEAM and GAS ENGINES; SCRUBBERS; WATER GAS PLANT.
The Original Firm.
W. G. BEAUMONT & SON, PRIORY WORKS, BOW, LONDON, E. 3.
(Percy E. Beaumont). Established 1892.
'Phones, East 0379/4410. Wires, Norustbeau, London.

WANTED—One Steam-Driven Gas EXHAUSTER, "Bryan Donkin," for 40,000 or 50,000 c.ft.
All Particulars, Condition, and Price, to "ENGINEER," BESSEMER HOUSE, 41, GRANVILLE ROAD, FALLOWFIELD, MANCHESTER.

CONTRACTS OPEN.

CITY OF PLYMOUTH.
(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive TENDERS for the Supply, Delivery, and Erection of:
(*a*) 2 Million SPIRAL-GUIDED GASHOLDER, complete with STEEL TANK, &c.
(*b*) FOUNDATIONS for above.
Specification and particulars may be obtained on application to the undersigned.
Sealed Tenders, endorsed "Gasholder" or "Gasholder Foundations," and addressed to the Town Clerk, Municipal Buildings, Plymouth, must be received not later than the first post, Nov. 25, 1929.
The Corporation do not bind themselves to accept the lowest or any Tender.
F. BLACKBURN, A.M.Inst.C.E., &c.
Engineer and General Manager.
Gas-Works,
Devonport,
Oct. 25, 1929.

CITY OF SALFORD.

TENDERS are invited for the Supply of RETORTS, FIREBRICKS, &c., required during the ensuing Twelve Months.
Full particulars may be obtained on application to the Gas Engineer, Gas Offices, Bloom Street, Salford.
H. H. TOMSON,
Town Clerk.

CORPORATION OF NEWBURY.
(GAS DEPARTMENT.)

THE Gas Committee have under Consideration the Erection of a ROTARY COKE SCREEN.
Particulars of Requirements may be obtained from the undersigned.
W. R. DAVEY,
Engineer and Manager.
Gas-Works,
Newbury,
Oct. 28, 1929.